PB88-185764

Superfund Record of Decision (EPA Region 2)
Vega Alta Public Supply Wells, Puerto Rico
(First Remedial Action), September 1987

(U.S.) Environmental Protection Agency
Washington, DC

29 Sep 87

U.S. Department of Commerce
National Technical Information Service

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Emergency and
Remedial Response

EPA/ROD/R02-87/050
September 1987

EPA

Superfund Record of Decision:

Vega Alta, PR

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First Remedial Action

5. REPORT DATE September 29, 1987

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16. ABSTRACT

The Vega Alta Public Supply Wells site is a public water supply well field located in the municipality of Vega Alta, Puerto Rico, approximately 32 km west of San Juan where ground water is the primary source of water. The well field consists of eight active wells and two inactive wells. It currently supplies about 3.8 million gallons per day of water to Vega Alta and surrounding residential areas. The Puerto Rico Aqueduct and Sewer Authority (PRASA) is responsible for operation and maintenance of the public water supply system. The first indication of contamination was discovered in June 1983, when a survey of public water wells made by the U.S. Geological Survey detected 574 ug/l of trichloroethylene (TCE) in the Ponderosa public supply well. Other VOCs were detected at lower concentrations in non-public wells in the well field system and ground water contamination was suspected. In June and August of 1983 Ponderosa and well GE 1 were shut down by PRASA because of contamination, respectively. This shut down caused a potential water supply shortage in Vega Alta. PRASA constructed well Bajura 3 to eliminate the shortage. In 1984 an air stripper was constructed at the Ponderosa well and operated until May 1985 when technical problems arose with the air stripper. Currently, ground water is contaminated with 1,1,1-trichloroethene, tetrachloroethene, 1,2-dichloroethene, 1,1-dichloroethene and other VOCs.
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Vega Alta, PR First Remedial Action Contaminated Media: gw Key contaminants: VOCs, PCE, TCE		

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EPA/ROD/R02-87/050
Vega Alta, PR
First Remedial Action

16. ABSTRACT (continued)

The selected remedial action for this site includes: treatment of PRASA wells GE 1, GE 2 and Bajura 3 by individual treatment systems with discharge of treated effluent into the PRASA distribution system for public use; treatment of Ponderosa well by scaling pretreatment and air stripping; discharge of treated effluent from the Ponderosa well to Honda Creek; shut down of Monterrey 2 and G&M private wells with hookup to the PRASA distribution system; and initiation of a subsequent RI/FS to fully assess and evaluate the source(s) of contamination. The estimated capital cost for this remedial action is $4,106,000 with annual O&M of $581,000.

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DECLARATION STATEMENT

Record of Decision

Vega Alta Public Supply Wells

SITE NAME AND LOCATION

Vega Alta Public Supply Wells Site, Vega Alta, Puerto Rico.

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the Vega Alta Public Supply Wells Site, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, published November 20, 1985.

STATEMENT OF BASIS

This decision is based upon the administrative record for the Vega Alta Public Supply Wells Site. A copy of the record is available for review at the information repository for the site and at the EPA Caribbean Field Office. The following documents, which are part of the administrative record, were primarily relied upon in making this decision:

- Remedial Investigation Report, Vega Alta Public Supply Wells Site, prepared by NUS Corporation, May 1986
- Feasibility Study Report, Vega Alta Public Supply Wells Site, prepared by Ebasco Services Inc., July 1987
- The attached Summary of Remedial Alternative Selection for the Vega Alta Public Supply Wells Site.
- The attached Responsiveness Summary for the site, which incorporates public comments received.
- Staff summaries and recommendations.

DESCRIPTION OF SELECTED REMEDY (Groundwater Contamination Operable Unit)

The remedial alternative presented in this document is the first operable unit of a permanent solution for the site. It focuses on groundwater contamination. Source control actions will be considered at a later date once an additional remedial investigation/feasibility study is completed.

This Record of Decision calls for the following actions:

- ° Treatment of Puerto Rico Aqueduct and Sewer Authority (PRASA) wells GE 1, GE 2, and Bajura 3 by individual treatment systems generally consisting of scaling pretreatment, air stripping and possibly activated carbon. The specifics of the treatment system will be determined during the Remedial Design.

- Treated effluent will be discharged into the PRASA distribution system for public use.
- Treatment of Ponderosa well by scaling pretreatment and air stripping.
- Treated effluent from the Ponderosa well will be discharged to Honda Creek in accordance with the existing National Pollutant Discharge Elimination System (NPDES) permit; the effluent will meet the same quality requirements as for PRASA wells GE 1, GE 2, and Bajura 3 such that Ponderosa treated water can eventually be utilized for water supply in the future. Activated carbon treatment could be added to this treatment process should the need arise.
- Monterrey 2 and G&M private wells will be shut down and each user will be connected to the PRASA distribution system.
- A subsequent remedial investigation/feasibility study will be initiated to fully assess and evaluate the sources of contamination.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, I have determined that the selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this groundwater contamination operable unit, and is cost-effective. The statutory preference for treatment, while not fully satisfied in that the sources still need to be considered, is partially addressed in that the groundwater treatment system reduces the toxicity and volume of contaminants.

The Commonwealth of Puerto Rico has been consulted and agrees with the selected remedy. A letter from the Chairman of the Environmental Quality Board of Puerto Rico is attached.

I have also determined that the actions being taken are appropriate when balanced against the availability of Superfund monies for use at other sites.

SEPTEMBER 29, 1987
Date

Christopher J. Daggett
CHRISTOPHER J. DAGGETT
Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
VEGA ALTA PUBLIC SUPPLY WELLS SITE
PUERTO RICO

SITE LOCATION AND DESCRIPTION

This summary addresses management of contaminated groundwater as the first site Operable Unit since it is considered critical for protection of public health and reduction of risks associated with ingestion of the groundwater. Source control actions are considered less critical from a public health standpoint and will be addressed at a later date once additional source investigations are completed.

The Vega Alta Public Supply Wells Site is a public water supply wellfield located in the municipality of Vega Alta, Puerto Rico (Figure 1). Vega Alta is in the north coast limestone region of Puerto Rico, approximately 32 kilometers west of San Juan. The wellfield consists of approximately 8 active and 2 inactive wells and is currently supplying approximately 3.8 million gallons per day of water to Vega Alta and surrounding residential areas (See Figure 2). Groundwater is the primary source of water for the public water system in Vega Alta. The Puerto Rico Aqueduct and Sewer Authority (PRASA) is responsible for operation and maintenance of the public water supply system.

Wells in the Vega Alta area obtain water principally from the Aguada and the Upper Cibao Limestone formations. The thickness of these two formations is approximately 130 meters and the depth to the water table ranges from 20 to 60 meters, depending on the surface elevation. The regional groundwater flow direction is north toward the Atlantic Ocean, however, pumping of the wellfield has caused local drawdown conditions that alter the direction of flow in the vicinity of the operating wells.

Economic activity within the Municipality of Vega Alta includes agriculture (sugar cane and dairy farming) and light industrial manufacturing. Public sewer and water systems are present, however, many industrial facilities use onsite septic systems for sewage disposal.

The main concentration of industrial facilities is directly north of the Town of Vega Alta and is within the public wellfield areas (See Figure 3). Many of the industries are currently using chlorinated solvents in their operations. Most of the industries lease their plant facilities from the Puerto Rico Industrial Development Company (PRIDCO). Numerous tenants have operated in most of the PRIDCO buildings, the first of which was constructed in 1965.

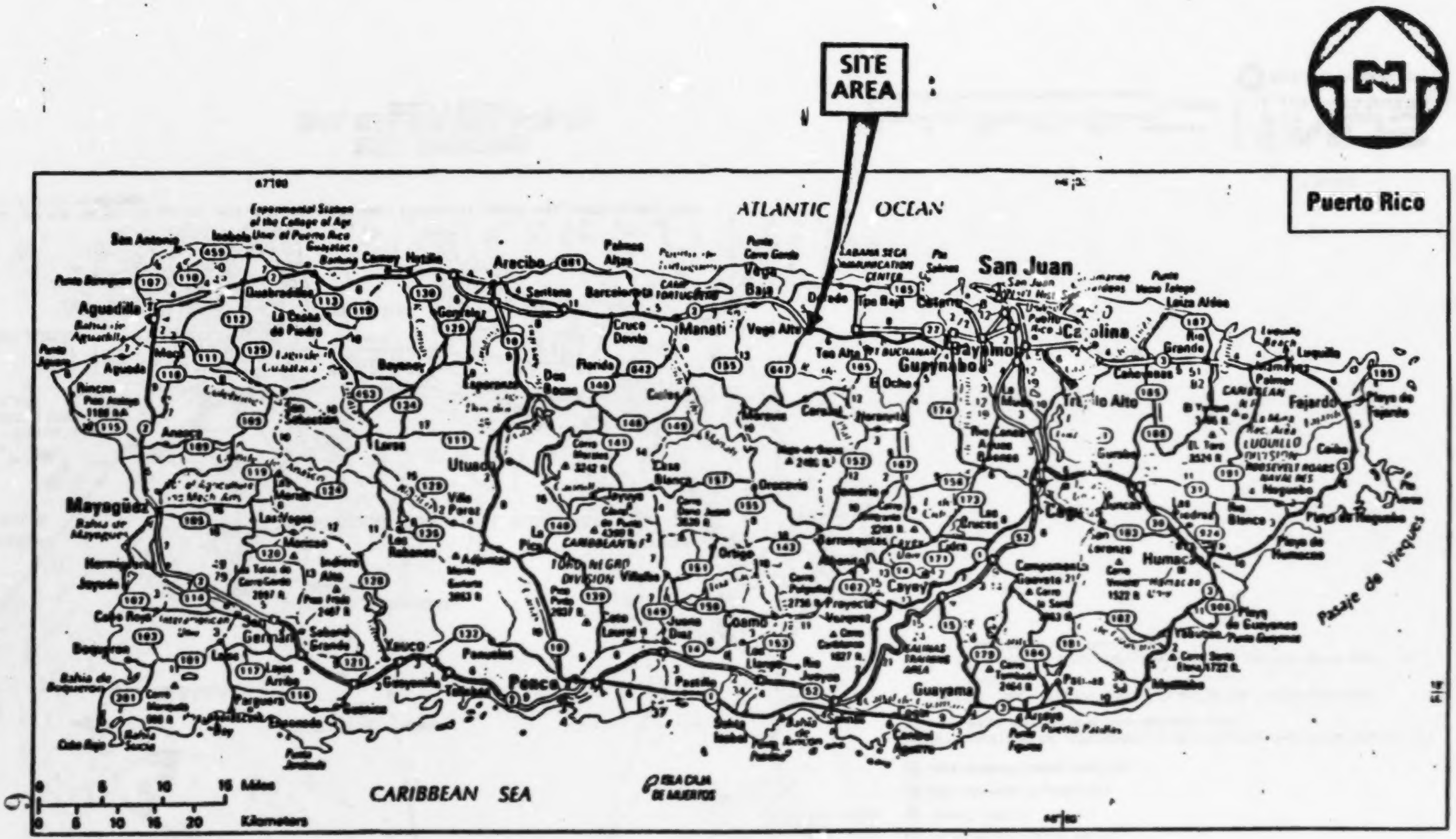
SITE AREA
Puerto Rico
ATLANTIC OCEAN
CARIBBEAN SEA
San Juan
Aguadilla
Mayagüez
Arecibo
Manatí
Vega Baja
Vega Alta
Dorado
Bayamón
Guaynabo
Carolina
Caguas
Humacao
Fajardo
Ponce
Guayama
Cayey
Utuado
Pasaje de Vieques
0 5 10 15 Miles
0 5 10 15 20 Kilometers

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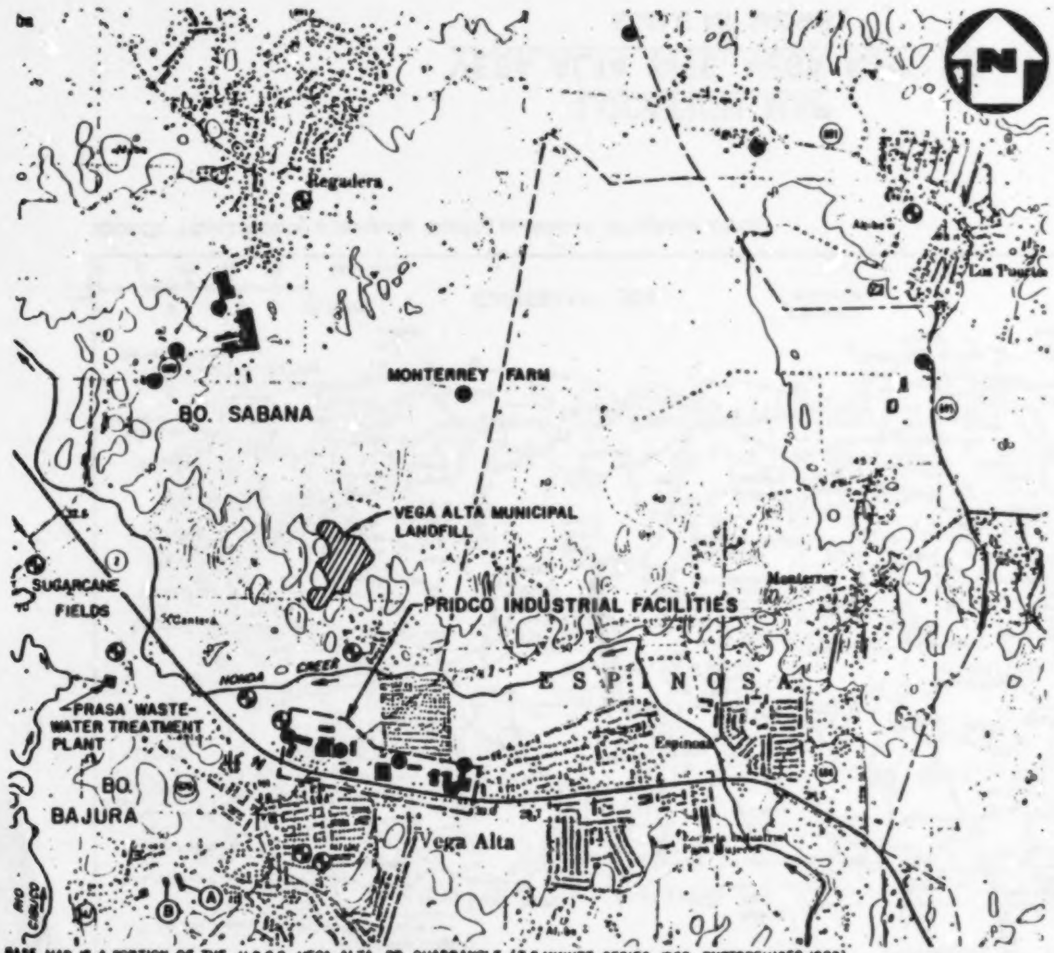
FIGURE 1

LOCATION MAP

VEGA ALTA SITE, VEGA ALTA, PR

SCALE AS SHOWN

NUS CORPORATION


Regadera
BO. SABANA
MONTERREY FARM
VEGA ALTA MUNICIPAL LANDFILL
SUGARCANE FIELDS
PRIDCO INDUSTRIAL FACILITIES
HONDA CREEK
ESPINOSA
Espinosa
Monterrey
PRASA WASTE-WATER TREATMENT PLANT
BO. BAJURA
Vega Alta
RIO CIBUCO
N

BASE MAP IS A PORTION OF THE U.S.G.S. VEGA ALTA, PR QUADRANGLE (7.5 MINUTE SERIES 1969, PHOTOREVISED 1982)
CONTOUR INTERVAL 10 METERS.

LEGEND

- ● PRASA WATER SUPPLY WELLS
- ● PRIVATE WELLS
- Ⓐ VEGA TRONICS INC. (PRIVATE)
- Ⓑ ABLE MANUFACTURING (PRIVATE)

NOTE: 1. LOCATIONS OF VEGA TRONICS & ABLE MANUFACTURING TAKEN FROM EPA TAT. FIELD VERIFICATIONS HAVE NOT BEEN MADE.

2. SEE FIGURE 2-2 FOR A DETAILED MAP OF THE PRIDCO INDUSTRIAL FACILITIES.

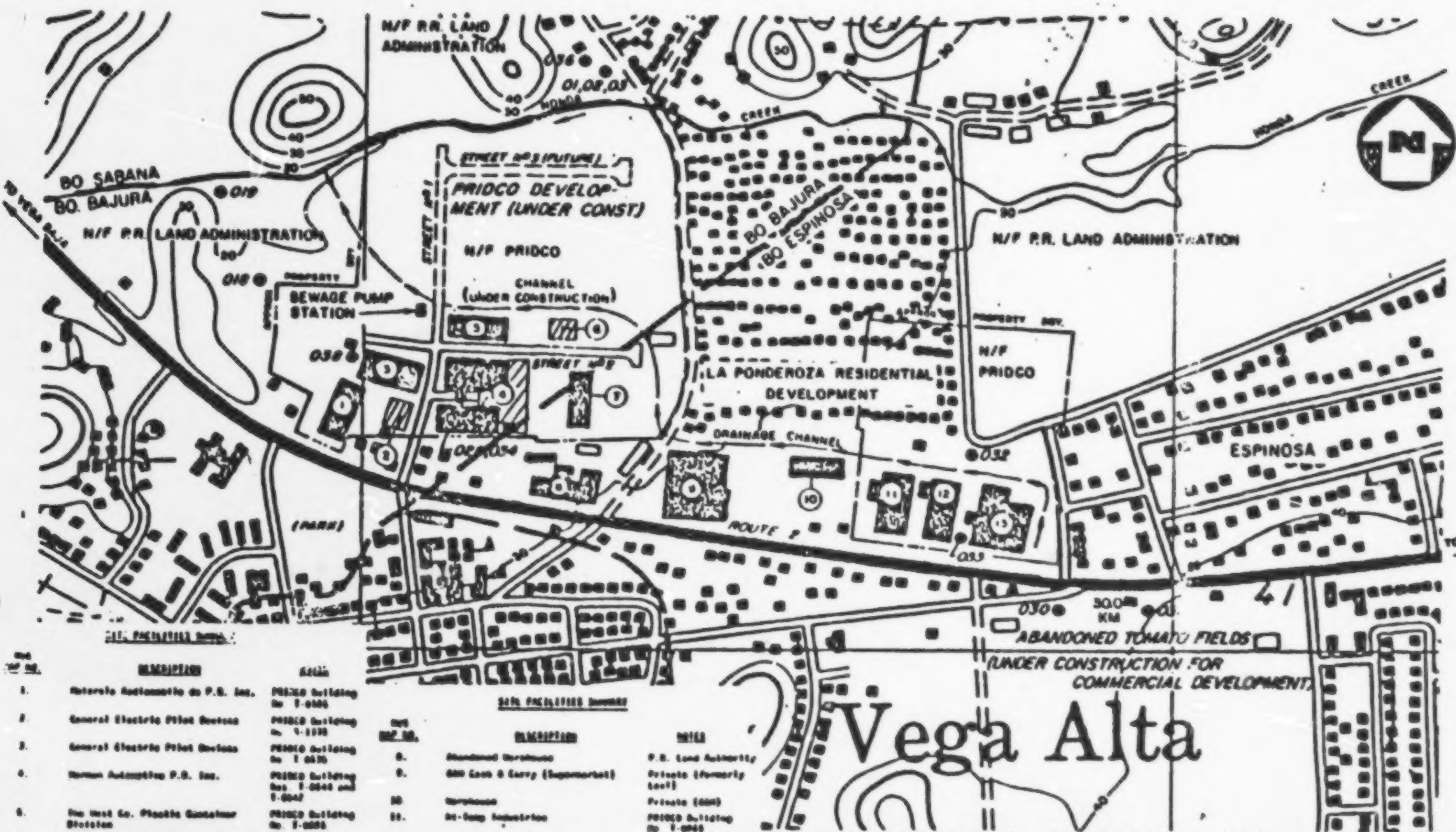
3. SEE FIGURE 4-2 FOR A DETAILED MAP OF THE EXISTING WATER SUPPLY & MONITORING WELL LOCATIONS.

FIGURE 2

SITE CONDITIONS
VEGA ALTA SITE, VEGA ALTA, PR
SCALE 1:20,000

1000 0 1000 2000 3000 4000 FEET
.5 0 1 KILOMETER

NUS CORPORATION
A Halliburton Company


N/F P.R. LAND ADMINISTRATION
01,02,03
HONDA
CREEK
BO SABANA
BO. BAJURA
019
N/F P.R. LAND ADMINISTRATION
018
PROPERTY
BEWAGE PUMP STATION
038
STREET NO 3 (FUTURE)
PRIDCO DEVELOPMENT (UNDER CONST)
STREET NO 1
N/F PRIDCO
CHANNEL (UNDER CONSTRUCTION)
STREET NO 2
034
(PARK)
BO BAJURA
BO ESPINOSA
LA PONDEROZA RESIDENTIAL DEVELOPMENT
DRAINAGE CHANNEL
PROPERTY DIV.
N/F PRIDCO
032
033
ROUTE 2
N/F P.R. LAND ADMINISTRATION
ESPINOSA
TO SAN JUAN
TO VEGA BAJA
030
300.0 KM
ABANDONED TOMATO FIELDS
(UNDER CONSTRUCTION FOR COMMERCIAL DEVELOPMENT)
Vega Alta
N

BASE MAP IS A PORTION OF THE U.S.G.S. VEGA ALTA, PR QUADRANGLE (7.5 MINUTE SERIES 1969, PHOTO-REVISED 1982). CONTOUR INTERVAL 10 METERS

SITE FACILITIES SUMMARY

MAP NO.	DESCRIPTION	NOTES
1.	Motorola Radiomovil de P.R. Inc.	PRIDCO Building No. [illegible]
2.	General Electric Pilot Devices	PRIDCO Building No. [illegible]
3.	General Electric Pilot Devices	PRIDCO Building No. [illegible]
4.	Harman Automotive P.R. Inc.	PRIDCO Building Nos. [illegible] and [illegible]
5.	The West Co. Plastic Container Division	PRIDCO Building No. [illegible]
6.	The West Co. Plastic Container Division (a)	PRIDCO Building No. [illegible]
7.	The West Co. Plastic Container Division (a)	PRIDCO Building No. [illegible]

SITE FACILITIES SUMMARY

MAP NO.	DESCRIPTION	NOTES
8.	Abandoned Warehouse	P.R. Land Authority
9.	[illegible] Cash & Carry (Supermarket)	Private (formerly [illegible])
10	Warehouse	Private ([illegible])
11.	[illegible] Industries	PRIDCO Building No. [illegible]
12.	[illegible] Packaging P.R. Inc.	PRIDCO Building No. [illegible]
13.	General Electric Controls Inc.	PRIDCO Building No. [illegible]

038 ◉ EXISTING WELL & NUS SAMPLE NUMBER. (SEE FIGURE 6-1)
(a) PRIDCO BUILDINGS PURCHASED BY WEST CO.

SITE INDUSTRIAL/COMMERCIAL FACILITIES
VEGA ALTA SITE, VEGA ALTA, PR
SCALE 1:5000

300 FT 0 500 1000 FEET
100 m 0 100 200 300 METERS

FIGURE 3

NUS CORPORATION
A Halliburton Company

The Vega Alta municipal landfill is currently operating north of the industrial area and is also within the public wellfield area. The landfill has been in operation since at least 1971 and does not employ any leachate containment or treatment systems.

SITE HISTORY

The first indication of contamination was found in June 1983 when a survey of public water wells made by the U.S. Geological Survey (USGS) detected 574 parts per billion of trichloroethylene in the Ponderosa public supply well. Other volatile organics were detected at lower concentrations in other wells in the wellfield systems and groundwater contamination was suspected. In September 1983 the Vega Alta Site was placed, by EPA, on the National Priorities List of known or threatened releases. Ponderosa and Well GE 1 were shut down by PRASA because of contamination in June and August of 1983, respectively. This shut down caused a potential water supply shortage in Vega Alta, however, PRASA constructed well Bajura 3 to eliminate the shortage. The EPA Technical Assistance Team (TAT) initiated sampling in September 1983 which continued until March 1984. Analytical results over this 16 month period indicated that the groundwater volatile organic contaminant plume had not significantly migrated and had been substantially reduced in average concentration. The public wellfield operation, including a number of private wells, has effectively contained the contaminated groundwater and has removed contaminants by pumping.

The EPA TAT also made site visits to the industrial plants in October 1983 and provided general descriptions of hazardous substance usage and hazardous wastes disposal practices. Three potentially responsible parties were identified and Notice Letters were sent by the Agency to those companies on July 27, 1984. None of the companies indicated a willingness to voluntarily undertake the response actions outlined in EPA's July 1984 Notice Letter.

A federally-funded Remedial Investigation and Feasibility Study was initiated at the site in April 1984 by the NUS Corporation assisted by the United States Geological Survey (USGS). USGS performed drilling, soil sampling, and monitoring well construction under an interagency agreement with the EPA.

In 1984 PRASA constructed an air stripper at the Ponderosa Well. From approximately September 1984 to May 1985, the stripping unit was operated on a test basis to evaluate its treatment efficiency. During the early phases of operation, the stripper was approximately 98.6 percent efficient in removing tetra and trichloroethene. The unit discharge was to Honda Creek. However, scaling problems apparently arose which reduced the mass transfer capacity of the stripper. The stripper operation has been stopped since May 1985 and the Ponderosa Well is inoperative.

REMEDIAL INVESTIGATION

The Vega Alta Site Remedial Investigation (RI) was performed from April 1984 to March 1985. The final RI Report was submitted to EPA in May 1986. The objectives of the RI were geared to characterize the hydrogeologic system, determine the extent and type of hazardous substances in groundwater, make a preliminary assessment of potential contamination sources and evaluate the migration potential of contaminants from the ground surface to the water table.

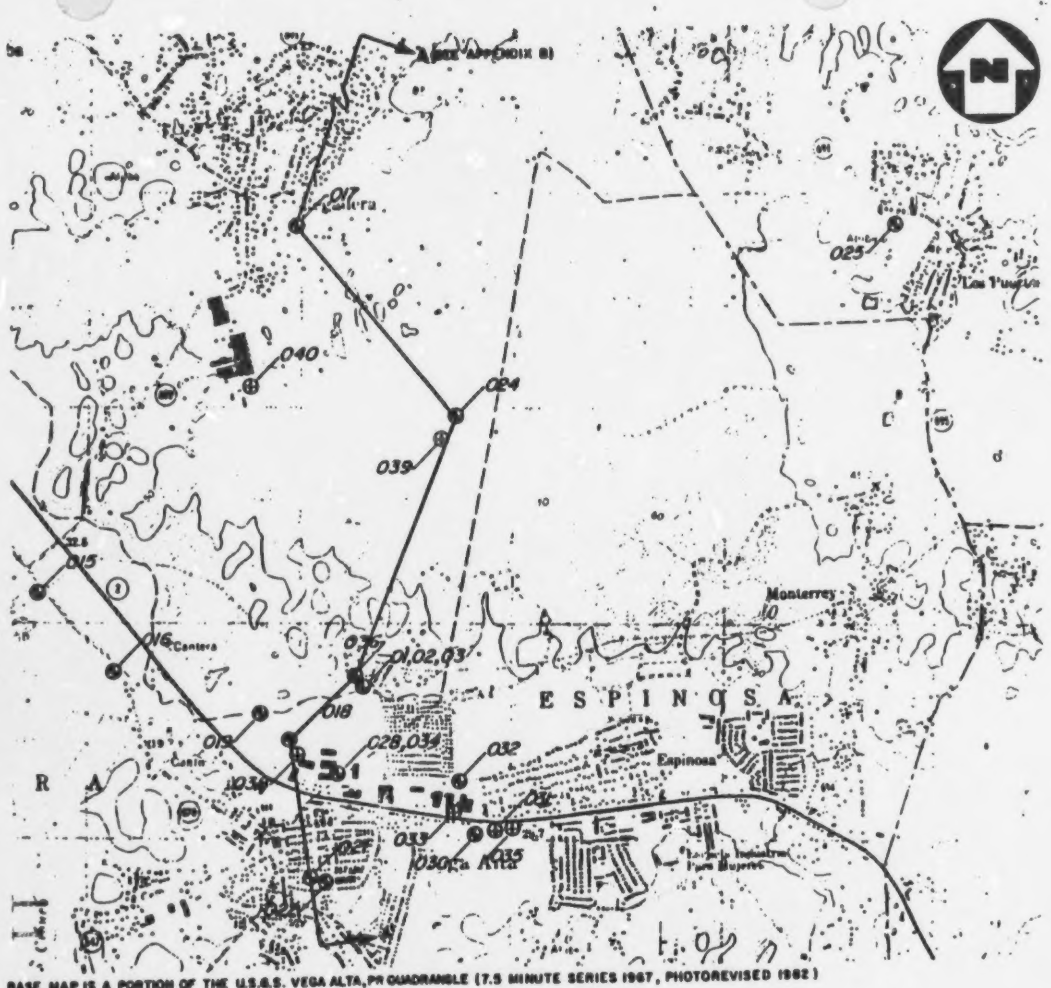
Groundwater analyses were performed on 168 samples from 23 wells. Groundwater sample locations are shown on Figure 4. Volatile organic compounds were identified as the contaminants of highest concentrations and potential public health risk. These compounds and their frequency of detection are shown on Table 1. These results confirmed the analytical work of the Puerto Rico Department of Health and EPA TAT investigations performed prior to the RI.

The analytical results obtained indicates that the groundwater volatile organic contaminant plume has not significantly migrated and has been substantially reduced in average concentration. The pumping of the public wellfield, along with a number of private wells, has effectively contained the contaminated groundwater and has removed contaminants from the aquifer by pumping.

Volatile organics are decreasing over time in most of the wells in the center area of the plume. Slight increases in concentrations are occurring along the north and northwest areas of the plume fringe, which indicates a slow migration toward other actively pumping wells.

The volatile contaminant plume has been estimated to have been reduced 58 percent in average concentration and 62 percent in contaminant mass over the 16 month sampling period. The groundwater contaminant plume character is not consistent over its total area. Trichloroethylene has been detected throughout the entire plume area, however, tetrachloroethylene and 1,1,1-trichlorethane are found predominantly in the western portions of the plume.

The PRASA water distribution system consisting of eight active wells, Vega Alta 1 and 2, Bajura 1 and 2, General Electric 1 and Maguayo 2, 3 and 4, was sampled at six tap locations in the Vega Alta area. These locations are shown on Figure 5. A total of 62 distribution system samples were taken at a


N
(SEE APPENDIX B)
017
Cantera
025
Los Puertos
040
024
039
015
016 Cantera
036
01,02,03
018
019
028,034
032
Cañío
038
033
030
031
035
022
021
Monterrey
ESPINOSA
Espinosa
R A

BASE MAP IS A PORTION OF THE U.S.G.S. VEGA ALTA, PR QUADRANGLE (7.5 MINUTE SERIES 1967, PHOTOREVISED 1982)
CONTOUR INTERVAL 10 METERS.

GROUNDWATER SAMPLE LOCATIONS
VEGA ALTA SITE, VEGA ALTA, PR
SCALE: 1:20,000

GROUNDWATER SAMPLE SUMMARY

Sample Name	NUS Number GW-	Description
Regadera	017	PRASA No. 48-A
Forest Star	025	PRASA Well No. 48
Monterrey II	024	Private Well
Bajura III	015	PRASA Well No. 68-A
Bajura II	016	PRASA Well No. 69
Ponderosa	036	PRASA Well No. 70
GE II	019	PRASA Well No. 71
GE I	018	PRASA Well No. 72
GE BI	032	PRASA Well No. 75
GE BII	033	Private Well
GE BIII	038	Private Well
Vega Alta I	021	PRASA Well No. 78
Vega Alta II	022	PRASA Well No. 79
Owens-Illinois	040	Private Well
Harmon I	028	Private Well
Harmon II	034	Private Well
Tomato	031	Private Well
Tomato II	035	Private Well
P1	001	EPA Monitoring Well
P2	002	EPA Monitoring Well
P3	003	EPA Monitoring Well
P4	030	EPA Monitoring Well
P5	039	EPA Monitoring Well

LEGEND

● EXISTING WELL - SURVEYED LOCATION
⊕ EXISTING WELL - APPROXIMATE LOCATION
PRASA PUERTO RICO AQUEDUCT & SEWER AUTHORITY

1000 0 1000 2000 3000 4000 FEET
.5 0 1 KILOMETER

FIGURE 4

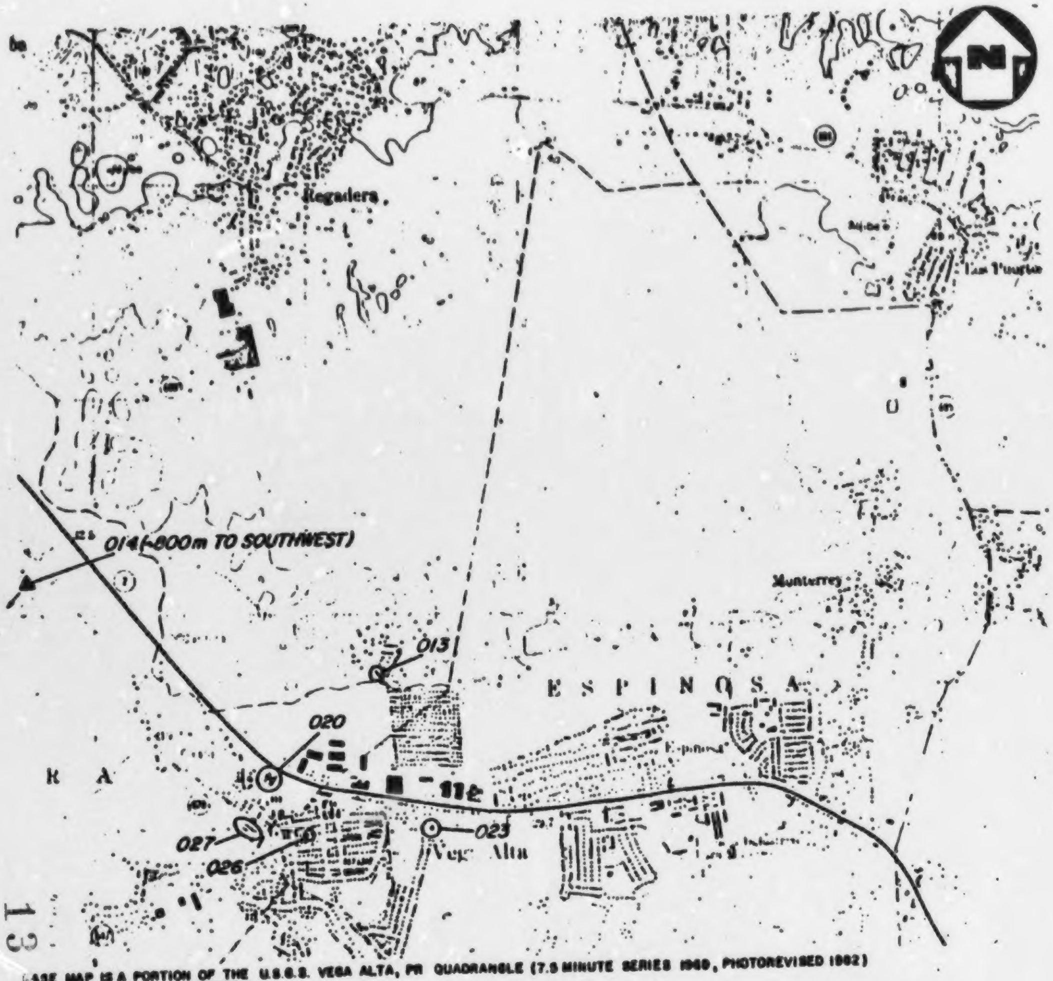
NUS CORPORATION

TABLE 1

VOLATILE COMPOUNDS AND FREQUENCY OF DETECTION IN GROUNDWATER

Compound	Samples Analyzed	Samples Detected	Percent Detected	Maximum Concentration (ppb)
Methylene chloride	168	14	8.3	3.7/330(c)
1,1-Dichloroethene	168	77	45.8	21
1,1-Dichloroethane	168	65	38.7	26
1,2-dichloroethene	168	89	53	74
1,1,2-Trichlorotrifluoroethane	140	18(a)	12.9	8.4
1,2-Dichloroethane	168	17	10.1	20
1,1,1-Trichloroethane	168	42	25	31
Trichloroethene	168	145	86.3	670
Benzene	168	9	5.4	7.5
Tetrachloroethene	168	81	48.2	140
Bromoform	28	2(b)	7.1	4.1(c)
Chloroform	28	6(b)	21.4	7
2-Butanone	28	1(b)	3.6	150
1,2-Dichloropropane	28	6(b)	21.4	15
Toluene	28	6(b)	21.4	24
Acetone	28	1(b)	3.6	35(c)

(a) Detected by NUS Field GC only.
(b) Detected by EPA CLP only.
(c) Use data with caution, possibly blank or lab contamination.



BASE MAP IS A PORTION OF THE U.S.G.S. VEGA ALTA, PR QUADRANGLE (7.5 MINUTE SERIES 1969, PHOTOREVISED 1982)
CONTOUR INTERVAL 10 METERS.

WATER DISTRIBUTION SYSTEM SAMPLE LOCATIONS
VEGA ALTA SITE, VEGA ALTA, PR
SCALE 1:20,000

WATER DISTRIBUTION SYSTEM SAMPLE SUMMARY

Sample Name	NUS Number GW-	Description
Lopez Bar	013	PRASA Water Distribution System
Riviera Family	014	PRASA Water Distribution System
Health Center	020	PRASA Water Distribution System
Police Station	023	PRASA Water Distribution System
Vega Alta Town Hall	026	PRASA Water Distribution System
San Antonio High School	027	PRASA Water Distribution System

NOTE: SEE APPENDIX-A FOR A MAP OF THE PRASA WATER DISTRIBUTION SYSTEM.
PRASA - PUERTO RICO AQUEDUCT & SEWER AUTHORITY

1000 0 1000 2000 3000 4000 FEET
.5 0 1 KILOMETER

FIGURE 5

NUS CORPORATION

frequency of once per month during the RI. The volatile organic analyses performed on water distribution system samples taken from May 1984 to January 1985 indicated that 15 compounds were detected at least one time in at least one sample. These compounds and their frequency of detection are shown on Table 2.

The water distribution system sample analyses indicate that the volatile compound most frequently detected and at the highest concentration is trichloroethene. The next most frequently detected compounds are tetrachloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and 1,2-dichloroethene. These four compounds and trichloroethene are also five of the six most detected compounds in groundwater (which includes 1,1-dichloroethane). This agreement between the compounds detected in groundwater and the distribution system is expected because the tap waters in Vega Alta are essentially withdrawn directly from groundwater. Volatile organic compounds concentrations in the distribution system were below action levels for a removal action, therefore no action was undertaken.

RISK ASSESSMENT

The primary exposure mechanism and subsequent public health risk at the Vega Alta Site is attributable to the ingestion or other domestic use of contaminated groundwater distributed through the PRASA system. Although the primary exposure route at the Vega Alta Site is through ingestion of groundwater, other exposure mechanisms such as inhalation of volatile components during showering and dermal contact during bathing also exist. This section will present the potential for carcinogenic and noncarcinogenic human health risks associated with exposure to groundwater contaminants through ingestion; the major exposure route (NUS, May 1986).

The major contaminants detected in the groundwater are volatile organics. As a class, volatile organics are soluble in water and do not display a marked tendency to adsorb to soil particles, therefore, they will continue to migrate via groundwater advection. For most of these compounds, chemical and biological processes are unlikely to attenuate the observed concentrations to a large extent. Reductions of concentrations will occur primarily through dispersion and dilution.

Noncarcinogenic Risks

Noncarcinogenic effects associated with ingestion of groundwater were examined through comparison of the observed concentrations to the USEPA Drinking Water Health Advisories and reference doses.

TABLE 2

VOLATILE COMPOUNDS AND FREQUENCY OF DETECTION IN WATER DISTRIBUTION SYSTEMS

Compound	Samples Analyzed	Samples Detected	Percent Detected	Maximum Concentration (ppb)
Methylene chloride	62	3	4.8	2.9/26(c)
1,1-Dichloroethene	62	41	66.1	27
1,1-Dichloroethane	62	30	48.4	5
1,2-dichloroethene	62	40	64.5	6
1,1,2-Trichlorotrifluoroethane	16	9(a)	56.3	17.1
1,2-Dichloroethane	62	3	4.8	2.7
1,1,1-Trichloroethane	62	48	77.4	7
Trichloroethene	62	61	94.4	42
Benzene	62	3	4.8	2.5(c)
Tetrachloroethene	62	55	88.7	10
2-Butanone	8	1(b)	12.5	16
Bromoform	8	2(b)	25	3/4.1(c)
Chloroform	8	2(b)	25	7
Bromodichloromethane	8	1(b)	12.5	6
Dibromochloromethane	8	1(b)	12.5	6

(a) Detected by NUS Field GC only.
(b) Detected by EPA CLP only.
(c) Use data with caution, possibly blank or lab contamination.

Maximum observed concentrations in samples from monitoring wells, PRASA supply wells, and taps do not exceed applicable values for gauging noncarcinogenic effects. Therefore, no threshold health impacts are anticipated through groundwater ingestion.

Carcinogenic Risk

Organic contaminants detected in well samples that are known or suspected carcinogens (i.e., no known threshold below which toxic effects would not occur) are shown in Table 3.

The table below includes estimated lifetime cancer risks associated with ingestion of the contaminants found in residential tap water samples and PRASA well samples. Lifetime cancer risks are based on calculations using the carcinogenic potency factors reported in the Superfund Public Health Evaluation Manual (USEPA, October 1986b).

Risk estimates were calculated for the mean, minimum, and maximum groundwater concentrations to provide a range of risk estimates. The actual exposures are those concentrations noted in the tap water samples. Receptors are not exposed to the concentrations observed in the PRASA well samples because of dilution that occurs in the water system.

To assess the total risk posed by the presence of more than one known or suspected carcinogen, risk estimates calculated for single contaminants are added (USEPA, October 1986b). The total potential carcinogenic risk to residents associated with ingestion of the current water supply is:

	Risks	
	Tap Water	PRASA Wells
For Minimum Concentration	1.1×10^{-5} (1 in 89,000)	1.3×10^{-5} (1 in 77,000)
For Mean Concentration	4.0×10^{-5} (1 in 25,000)	1.1×10^{-4} (1 in 9,000)
For Maximum Concentration	1.5×10^{-4} (1 in 6,700)	7.6×10^{-4} (1 in 1,300

TABLE 3

RISK ASSOCIATED WITH INGESTION OF CARCINOGENS
VEGA ALTA SITE

Contaminant	Carcinogenic Risk/Person					
	Residential Tap Water			PRASA Wells		
	Minimum Concentration	Mean Concentration	Maximum Concentration	Minimum Concentration	Mean Concentration	Maximum Concentration
Tetrachloroethene	1.2×10^{-6}@1.2 ug/l	4.9×10^{-6}@4.9 ug/l	1.0×10^{-5}@10 ug/l	1.0×10^{-6}@1.02 ug/l	1.3×10^{-5}@[illegible] 29 ug/l	3.3×10^{-5}@33 ug/l
Trichloroethene	1.7×10^{-6}@3.1 ug/l	9.0×10^{-6}@16.6 ug/l	1.7×10^{-5}@32 ug/l	6.0×10^{-6}@1.1 ug/l	2.9×10^{-5}@[illegible].2 ug/l	4.0×10^{-4}@877 ug/l
1,1-Dichloroethene	4.2×10^{-6}@1.0 ug/l	2.0×10^{-5}@4.7 ug/l	1.1×10^{-4}@27 ug/l	3.7×10^{-6}@0.88 ug/l	5.2×10^{-5}@[illegible].4 ug/l	2.0×10^{-4}@48 ug/l
1,2-Dichloroethane	3.5×10^{-6}@2.1 ug/l	4.2×10^{-6}@2.5 ug/l	4.6×10^{-6}@2.7 ug/l	1.8×10^{-6}@1.1 ug/l	1.1×10^{-5}@6.4 ug/l	4.7×10^{-5}@28 ug/l
Benzene	5.9×10^{-7}@0.4 ug/l	2.0×10^{-6}@1.30 ug/l	3.7×10^{-6}@2.5 ug/l	*	*	3.4×10^{-6}@2.3 ug/l
Total Risk	1.1×10^{-5}	4.0×10^{-5}	1.5×10^{-4}	1.3×10^{-5}	1.1×10^{-4}	7.6×10^{-4}

* Benzene was detected only once, therefore, the risk was presented as a maximum concentration in order to present a "worst case" scenario.

Environmental Impacts

Based on the existing chemical-analytical data base and hydrogeologic conditions, no adverse environmental impacts are anticipated as a result of contaminant migration from the Vega Alta Site. Because of the complex hydrogeological conditions (i.e., groundwater flow in a Karst environment), it is not possible to model plume migration. Therefore, the conclusion regarding environmental impacts is based primarily on engineering judgment and experience. The primary discharge points for contaminated groundwater (in the absence of pumping) are the Prieta Marsh and the Atlantic Ocean. It is not expected that present or future contaminant loading to the marsh or the ocean will adversely affect environmental receptors. The marsh discharge point is approximately 3 miles from the Ponderosa Well. Pumping of the well field controls plume migration to a great extent. Further, in view of the even greater groundwater molecular diffusion, and other natural attenuation mechanisms, it is doubtful that measureable concentrations will extend to the discharge areas.

ALTERNATIVES EVALUATION

The remedial alternatives for the Vega Alta Public Supply Wells Site were developed and evaluated using the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR §300.68, and the "Guidance on Feasibility Studies Under CERCLA" as guidance.

The major objective of the FS is to evaluate remedial alternatives using a cost-effective approach consistent with the goals and objectives of CERCLA. According to Section 121 of CERCLA, the recommended remedial alternative should protect human health and the environment, should be cost-effective, and should utilize permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable. The proposed remedy must also attain applicable or relevant and appropriate federal and state public health and environmental requirements (ARARs) that have been identified for the site (see Tables 4,5 and 6). Section 300.68(e) of the NCP outlines procedures and criteria which are used in selecting the most cost-effective alternative.

TABLE 4

APPLICABLE, OR RELEVANT AND APPROPRIATE REQUIREMENTS - GROUNDWATER
VEGA ALTA SITE
VEGA ALTA, PUERTO RICO

Chemical	Maximum Observed(1) Concentration (µg/l)	MCLG(2) (µg/l)	MCL(3) (µg/l)	AWQC(4) (µg/l)	Health Advisory(5) (µg/l)	Reference Dose(6) (µg/l)	Puerto Rico Health Department(7) (µg/l)	Risk-Based (10^{-6})(8) (µg/l)
benzene	7.5(M)	0	5	(0.67)	--	--	5	0.7
toluene	24(M)	2,000(P)	---	15,000	2,420	10,500	--	NA
tetrachloroethene	33(S)	0(P)	---	(0.88)	5,000	700	50	0.7
trichloroethene	877(S)	0	5	(2.8)	--	--	--	2.8
1,2-dichloroethene	50(S)	70(P)	---	--	70	--	--	NA
1,1-dichloroethene	48(S)	7	7	(0.033)	7	315	--	0.23
1,1,1-trichloroethane	150(S)	200	200	--	200	18,900	1,000	NA
1,1-dichloroethane	26(M)	--	---	--	--	4,200	--	NA
1,2-dichloroethane	28(S)	0	5	--	2,600(C)	--	10	NA
methylene chloride	530(S)	--	---	(0.19)	--	2,100	150	NA

(1) M - Detected in monitoring well sample. S - Detected in PRASA supply well sample.

(2) Maximum Contaminant Level Goal (USEPA, November, 1985). P - Proposed value.

(3) Maximum Contaminant Level (USEPA, July, 1987). C - Chronic exposure (less than lifetime).

(4) Ambient Water Quality Criteria (USEPA, October, 1986b). Adjusted for drinking water only. Values in parentheses correspond to midpoint of cancer risk range (10^{-6}) for an individual contaminant.

(5) EPA Drinking Water Health Advisory (USEPA, March, 1987). Values presented are for lifetime (70-year) exposure unless otherwise noted. C - Chronic exposure (less than lifetime).

(6) Formerly Acceptable Daily Intake (USEPA, October, 1986b). Values presented are for oral exposure. Converted to concentrations by assuming ingestion of 2 liters/day and a body weight of 70 kg.

(7) Administrative Order Number 10 (see Appendix D).

(8) Values presented are for a cumulative risk of $1x10^{-6}$ (see Appendix D for calculations). Values presented for pervasive (frequently detected) carcinogens. NA - Not applicable. Values revised according to final rendition of Standards and Health Advisory Chart, USEPA, 9-9-87.

TABLE 5

APPLICABLE, OR RELEVANT AND APPROPRIATE REQUIREMENTS - SURFACE WATER
VEGA ALTA SITE
VEGA ALTA, PUERTO RICO

Chemical	NPDES Permit (µg/l)$^{(1)}$	AWQC$^{(2)}$ Aquatic Life (µg/l)	AWQC$^{(3)}$ Human Health (µg/l)
benzene	100	5.3×10^3	40*
toluene	100	1.75×10^4	4.24×10^5
tetrachloroethene	10	5.28×10^3	8.85*
trichloroethene	50	4.5×10^4	80.7*
1,2-dichloroethene	10	1.16×10^4	NA
1,1-dichloroethene	10	1.16×10^4	1.85*
1,1,1-trichloroethane	10	1.8×10^4	1.08×10^6
1,1-dichloroethane	100	NA	NA
1,2-dichloroethane	100	1.18×10^5	243*
1,1,2-trichlorotrifluoroethene	100	NA	NA
methylene chloride	100	1.1×10^4	15.7*

(1) Effluent limitations established on pages 5 and 11 of the National Pollutant Discharge Elimination System (NPDES) permit issued for Ponderosa stripper effluent (Appendix B).

(2) Ambient Water Quality Criteria for the protection of freshwater aquatic life (USEPA, November, 1980).

(3) Ambient Water Quality Criteria for the protection of human health through the ingestion of aquatic organisms (fish) (USEPA, November, 1980).

* Value corresponds to a carcinogenic risk of 1×10^{-6}.

NA Not Available.

TABLE 6

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS - AIR
VEGA ALTA SITE
VEGA ALTA, PUERTO RICO

Chemical	TLV (STEL) (mg/m^3)(1)	TLV (TWA) (mg/m^3)
benzene	75	30
toluene	560	375
tetrachloroethene	1,340	335
trichloroethene	1,080	270
1,2-dichloroethene	1,000	790
1,1-dichloroethene	80	20
1,1,1-trichloroethane	2,450	1,900
1,1-dichloroethane	1,010	810
1,2-dichloroethane	NR(2)	40
methylene chloride	1,740	350

(1) Source: ACGIH, 1986
(2) NA - Not Available

A five step process was developed and used to meet the FS objectives. The following is a summary of that process.

The first step is to evaluate human health and environmental effects associated with releases and threatened releases of hazardous substances from the site. Criteria to be considered are outlined in Section 300.68(e) of the NCP and include such factors as actual or potential direct contact with hazardous material, degree of contamination of drinking water, and extent of isolation and/or migration of the contaminants.

The next step is to develop a range of potential available remedial technologies that could be used to remediate the site. Remedial technologies where treatment permanently and significantly reduces the toxicity, mobility or volume of the hazardous substances as a principal element, are to be preferred over remedial technologies not involving such treatment. These technologies are initially screened on a technical basis. Based on the screening, a list of individual remedial technologies appropriate to site conditions and consistent with the remedial action objectives is developed.

The site-appropriate remedial technologies are then combined into a number of preliminary remedial alternatives. The basis for the various combinations are: the technical and logical interrelationship between separate technologies; Section 300.68(f) of the NCP requirements regarding the general categories of alternatives which must be considered and CERCLA Section 121 provisions regarding the preference for remedial actions that utilize permanent solutions and alternative treatment or resource recovery technologies. USEPA is in the process of revising the NCP to reflect these new provisions added by SARA. USEPA's "Interim Guidance on Superfund Selection of Remedy" memorandum, issued December 24, 1986, is intended to aid the Agency in the selection of remedial actions pending USEPA's upcoming revisions of the NCP. This summary reflects that guidance. USEPA's interim guidance requires analysis of alternatives involving: 1) treatment options; 2) containment of waste option with little or no treatment, but providing protection of human health and the environment primarily by preventing exposure or reducing the mobility of the waste and 3) the no-action alternative. These three categories of alternatives must be carried through the detailed evaluation process, but for the Vega Alta Site, groundwater containment alternatives have not been included. These are not considered feasible and will not be evaluated in the prescreening. The reasons for exclusion of these alternatives are related to the site hydrogeologic conditions.

The fourth step in the process is to provide an initial screening of these alternatives as delineated in Section 300.68(g) of the NCP. The three broad criteria that should be utilized in the screening are: the relative effectiveness in minimizing threats; the engineering feasibility of the alternatives; and the cost of implementing the remedial action.

Treatment options and the no-action alternative should be carried through this step. This general screening is intended primarily to reduce the number of remedial alternatives which will subsequently be evaluated in detail.

The final step as outlined in Section 300.68(h) of the NCP is to conduct a detailed analysis of the limited number of alternatives that remain after the initial screening. A treatment, containment, and no-action alternative should be included in this analysis. For each alternative, the following factors, as appropriate, are to be considered:

- An evaluation in terms of engineering implementation, reliability, and constructability;
- An assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of human health and the environment. This includes an evaluation of the extent to which the alternative attains or exceedes ARARs for the site. Where the analysis determined that federal and state human health and environmental requirements are not applicable, or relevant and appropriate, the analysis, as appropriate, evaluated the risks of the various exposure levels projected or remaining after implementation of the alternative under consideration;
- An analysis of whether recycle/reuse, waste minimization, waste biodegradation, destruction, or other advanced, innovative, or alternative technologies is appropriate to reliably minimize present or future threats to human health and the environment;
- An analysis of any adverse environmental impacts and methods for mitigating these impacts, and costs of mitigation;
- A detailed cost estimate, including operation and maintenance costs, and distribution of costs over time. This includes a cost comparison of alternatives within each category.

DEVELOPMENT OF ALTERNATIVES AND INITIAL SCREENING

Remedial response for the Vega Alta Public Supply Site will address the management of contaminated groundwater as the first Operable Unit since it is considered critical for protection of public health and reduction of risks associated with ingestion of the groundwater. Source control actions are considered less critical from a public health standpoint and will be addressed at a later date once additional source investigations are completed.

The effect of undefined source conditions on the performance evaluations of groundwater remedial alternatives is not expected to be critical over the long term because of two reasons:

- Groundwater remediation is estimated to require a longer time period than source control, which can be accomplished early in the lifetime of the groundwater restoration period. Delay of source control actions for a short time is not expected to significantly affect the ultimate time period required for cleanup of the groundwater.
- The groundwater plume has been shown to be decreasing in contaminant mass and average concentration based on the RI data collected from September 1984 to January 1986. This may suggest that the source of groundwater contamination has either been eliminated or has decreased significantly from the period prior to September 1984. However, since the sources are not fully identified and no significant source control is known to have occurred at nearby facilities significant further RI work is necessary before the trend can be substantiated.

The objectives of the remedial actions being evaluated are restoration of the aquifer, management of migration of contaminants in the groundwater system and protection of the public from adverse health impacts through groundwater ingestion. Criteria established to obtain these objectives are:

- Reduce contaminant levels in the groundwater.
- Protect uncontaminated groundwater for present/future use.
- Reduce contaminant levels at the tap to prevent unacceptable human exposures.

These objectives are based on the baseline risk assessment and on review of Applicable or Relevant and Appropriate Requirements (ARARs) and USEPA Draft Guidance for Remedial Actions for contaminated Groundwater at Superfund Sites (USEPA, October 1986).

For the Vega Alta Site remedial technologies were pre-screened for technical suitability. The pre-screening criteria included the following:

- Implementability - constructability and time to achieve cleanup.
- Applicability - physical and chemical suitability for site conditions.

Technologies that are not considered appropriate for utilization at the Vega Alta Site and a brief discussion of the reasons for their exclusion are listed in Table 7.

Table 8 lists and briefly describes the technically appropriate remedial technologies for the Vega Alta Site. These technologies were accepted on the basis that they are compatible with the specific site conditions and the remedial action objectives for this operable unit. These technologies were then assembled into alternatives. As a result, four remedial action alternatives as specified in Table 9, were developed for evaluation.

The four remedial alternatives have been subjected to an initial screening consistent with 40 CFR Section 300.68(g)(1), (2) and (3) of the NCP to narrow the list of potential remedial actions for further detailed analysis.

TABLE 7

Inappropriate Remedial Technologies

In-situ Treatment

- Biodegradation - Biodegradability of the existing levels of chlorinated aliphatics has not been adequately established, especially for aquifer restoration requiring risk levels of $1X10^{-4}$. The contaminated groundwater zone is currently in use as a major portion of the public water supply to Vega Alta and cannot be taken out of use without supplying alternate water.

- Vacuum Extraction - Vacuum extraction technologies have been demostrated on a limited basis for the removal of volatiles from the unsaturated zone. Applications for volatiles removal from the groundwater zone have not been demonstrated based on available literature. The application to saturated zone volatile removal is expected to be conceptually infeasible because of problems with withdrawal of groundwater into extraction wells and the limited stripping efficiency available because of the relatively small air to water surface interface area compared to other technologies, such as conventional air stripping towers.

Offsite Groundwater Treatment

- Publicly-Owned Treatment Works (POTW) - The wastewater treatment plant in Vega Alta, located away from the site is operating above design capacity and cannot accept additional discharges. The projected well discharge rates, even for one of the public wells, exceeds the existing design capacity of the POTW. Because of hydraulic loading constraints of the POTW, this technology is not applicable to handle the treatment of contaminated groundwater.

Tap Water Treatment

- Boiling-Mixing-Aeration - Although such a treatment approach is technically feasible, it would require that all residents employ them consistently. It is unlikely that the general population will do this and such treatment techniques are considered neither implementable nor reliable.

TABLE 8

Appropriate Remedial Technologies

Groundwater Treatment Onsite

- Air Stripping - This technology has been shown to be an effective method of removing volatile constituents from groundwater. It is a partitioning process in which the volatile organic contaminants are transferred from a dissolved state in the aqueous phase to the air phase through a water to air transfer process. Volatile organic removal efficiencies in excess of 99.9% can be achieved via air stripping technology.

- Carbon Adsorption - This technology has been extensively used for water treatment. It is a partitioning process in which the contaminants are transferred from a dissolved state in the aqueous phase to the surface of a solid phase, where they accumulate for subsequent extraction, and/or destruction. Water is passed through a treatment bed and the dissolved contaminants are removed from solution via a physical adsorption process.

- Pretreatment for Scaling - Problems have apparently been encountered during operation of the air stripper at the Ponderosa Well in Vega Alta. It has been reported that the stripper operates ineffectively as a result of scaling. Based on the nature of the aquifer at the Vega Alta Site (calcitic limestone) it is believed that the scaling problem is probably a result of stripping of dissolved carbon dioxide from the groundwater. Sodium hexametaphosphate pretreatment has been selected as a cost effective method of preventing calcite precipitation. Bench and pilot-scale studies will be required to determine material requirements and to demonstrate the effectiveness of the method prior to completing the remedial design.

Alternate Water Supplies

- New Wells - An alternate water supply yielding approximately 2,250 gallons per minute (gpm) must be provided to replace the cumulative supply which will be lost by eliminating the Ponderosa, GE-1, GE-2 and the Bajura 3 wells from the PRASA water supply system in Vega Alta.

- Surface Water - Surface water supplies are available for public water use in the Vega Alta area. The two principal streams in the site area, Rio de La Plata and Rio Cibuco, have sufficient base flows to provide a significant source of water for public use.

TABLE 9

Preliminary Remedial Action Alternatives

Alternative Number	Description
1	No action with site monitoring.
2	Groundwater Treatment with discharge into PRASA Distribution System (PRASA wells Ponderosa, GE 1, GE 2 and Bajura 3).
3	Groundwater Treatment with Surface Discharge and Alternate Water Supply by Surface Water intake and New Wells.
4	Water Treatment at Individual Public Water Supply Taps.

Detailed Evaluation of Alternatives

As a result of the screening process, a total of three remedial action alternatives were developed for detailed comparative evaluation at the Vega Alta Site. The major criteria for evaluation of the remedy are:

1. Compliance with ARARs
2. Reduction of Toxicity, Mobility or Volume
3. Short-Term Effectiveness
4. Long-Term Effectiveness and Permanence
5. Implementability
6. Cost
7. Community Acceptance
8. State Acceptance
9. Overall Protection of Human Health and the Environment

Factors for each evaluation criteria are summarized on Table 10. The alternatives were evaluated for both short-term and long-term considerations related to the criteria. Because of the uncertainty in estimating the rate of restoration of the contaminated portion of the aquifer, the evaluation as to the length of time required for full remediation is, of necessity, qualitative. These three remedial alternatives, and their associated capital costs and total present worth costs are provided in Table 11.

The detailed analysis of the three remedial action alternatives is summarized as follows:

Alternative 1 - No-Action with Monitoring

This alternative will not require any implementation of remedial actions and the level of present and future potential human health risks will continue unabated. Monitoring is proposed as part of this alternative to assess the levels of public risk over time and to track the migration of the contaminated groundwater. Groundwater and distribution system tap sampling is proposed on a quarterly basis. The proposed monitoring program includes sampling of 4 taps and 10 wells.

The no action alternative will not reduce present carcinogenic risks and will not comply with ARARs for drinking water quality unless contaminant levels decrease significantly through natural attenuation processes.

Based on historical trends as described in the RI report, the continued pumping of the existing wellfield is expected to actively remove contaminants from the groundwater. A future projection of contaminant reduction based on historical data

TABLE 10

EVALUATION FACTORS FOR REMEDIAL ALTERNATIVES
VEGA ALTA SITE

Effectiveness		Implementability			Cost
Protectiveness	Reduction of Toxicity, Mobility, or Volume	Technical Feasibility	Administrative Feasibility	Availability	Remedy
SHORT-TERM					
Reduction of existing risks Compliance with some ARARs Compliance with some criteria, advisories, and guidance Protection of community and workers during remedial actions Time until protection is achieved		Ability to construct technology Short term reliability of technology Compliance with some ARARs (primarily action-specific)	Ability to obtain approvals from other agencies Likelihood of favorable community response Coordination with other agencies Compliance with some location-specific ARARs Need to respond to other sites (104)	Availability of treatment, storage, and disposal services and capacity Availability of necessary equipment and specialists	Development and construction costs Operating costs for implementing remedial action Other capital and short-term costs until remedial action is complete

TABLE 10
EVALUATION FACTORS FOR REMEDIAL ALTERNATIVES
VEGA ALTA SITE
PAGE TWO

Effectiveness		Implementability			Cost
Protectiveness	Reduction of Toxicity, Mobility, or Volume	Technical Feasibility	Administrative Feasibility	Availability	Remedy
LONG-TERM					
Magnitude of residual risk Long-term reliability	Permanent significant reduction of toxicity, mobility or volume	Ease of undertaking additional remedial action, if necessary			Costs of operation and maintenance for as long as necessary
Compliance with some ARARs or TBCs		Ability to monitor effectiveness of remedy			Costs of 5-year reviews
Prevention of future exposure to residuals		Ability to perform operation and maintenance functions			Potential future remedial action costs
Potential ne[illegible] for replacement					

Table 11

REMEDIAL ALTERNATIVE COST SUMMARY
VEGA ALTA SITE
VEGA ALTA, PUERTO RICO

Remedial Alternative	Capital Costs ($1,000)	Annual O&M Costs ($1,000)	Present Worth Costs ($1,000)			
			1 year O&M	5 year O&M	10 year O&M	30 year O&M
No.1 - No Action	--	56	51	212	344	528
No.2 - Groundwater Treatment with Discharge to the PRASA Distribution System						
A. Treatment at wellhead	4,106	581	4,634	6,309	7,677	9,584
B. Treatment at central locations	4,134	498	4,587	6,021	7,194	8,828
No.3 - Groundwater Treatment with Surface Water Discharge and Alternate Water Supplies						
A. Treatment at wellhead	6,502	672	7,113	9,049	10,631	12,838
B. Treatment at central locations	6,306	585	6,838	8,524	9,902	11,823

might be valid if the sources(s) of contamination are remediated, however, source characterization has not been performed and the presence and degree of contaminant loading to the groundwater cannot be determined.

Furthermore, trend analyses for groundwater concentrations are not considered appropriate because of the complex characteristics of organic contaminant migration and complications arising as a result of hydrogeologic conditions. A verified contaminant transport model would have enabled a reasonable future prediction of groundwater conditions, however, a model is not applicable to the site because of the Karst geology.

Despite these limitations with respect to prediction of future conditions, it is expected that average groundwater contaminant levels will decline if the source(s) is controlled. A reduction in tap water concentrations should occur as groundwater concentrations decrease.

Groundwater contamination results in a mean carcinogenic risk of 1.1×10^{-4} and a maximum carcinogenic risk of 7.6×10^{-4} through ingestion. The mean incremental cancer risk is near the EPA Level III groundwater remediation level of 1×10^{-4}.

The ingestion-based risk levels are expected to decline over time, assuming that source control is implemented, however, the restoration rate to Level III or lower levels (I and II) cannot be determined at the present time.

The technical feasibility evaluation of this alternative is not applicable since remedial actions are not proposed. Ongoing monitoring of groundwater and taps is reliable for assessment of contaminant levels and can be performed over the long-term as required.

In addition, contaminant levels in tap water are in excess of the Maximum Contaminant Levels promulgated pursuant to the amendments to the Safe Drinking Water Act and the recent Puerto Rico Department of Health regulations.

This alternative does not address source control actions. Insufficient site data on the source(s) is available to identify and evaluate potential remedial alternatives for source(s) remediation. However, the groundwater plume has been decreasing in contaminant concentration based on the RI data collected from September 1984 to January 1986. This may suggest that the source of groundwater contamination has either been eliminated or has decreased significantly from the period prior to September 1984. Additional investigative studies will be conducted to fully define the source(s) of the groundwater contamination and evaluate any potential of contaminants to migrate to the groundwater system at Vega Alta.

Alternative 2 - Groundwater Treatment with Discharge to the PRASA Distribution System

This alternative involves treatment of 4 PRASA public supply wells and hook-up of two private groundwater users to the distribution system. The treated wells include:

- PRASA Ponderosa (currently inactive)
- PRASA GE 1 (currently inactive)
- PRASA GE 2 (currently active)
- PRASA Bajura 3 (currently active)

Treatment of PRASA wells GE 1, GE 2 and Bajura 3 will be by individual treatment systems consisting of scaling pretreatment, air stripping, and possibly activated carbon, contingent upon the results of pilot studies for the air strippers. Treated effluent will be discharged into the PRASA distribution system for public use. The efficiency and applicability of the treatment processes will be evaluated by bench and pilot scale treatability tests prior to final design and implementation of the specific treatment systems.

Treatment of Ponderosa well will be by scaling pretreatment and air stripping. Discharge shall be to Honda Creek in accordance with the existing NPDES permit; the effluent will meet the same quality requirements as for PRASA wells GE 1, GE 2, and Bajura 3 such that Ponderosa treated water can eventually be utilized for water supply in the future. Activated carbon treatment could be added to this treatment process should the need arise.

Two treatment scenarios are considered under this alternative and are designated as follows:

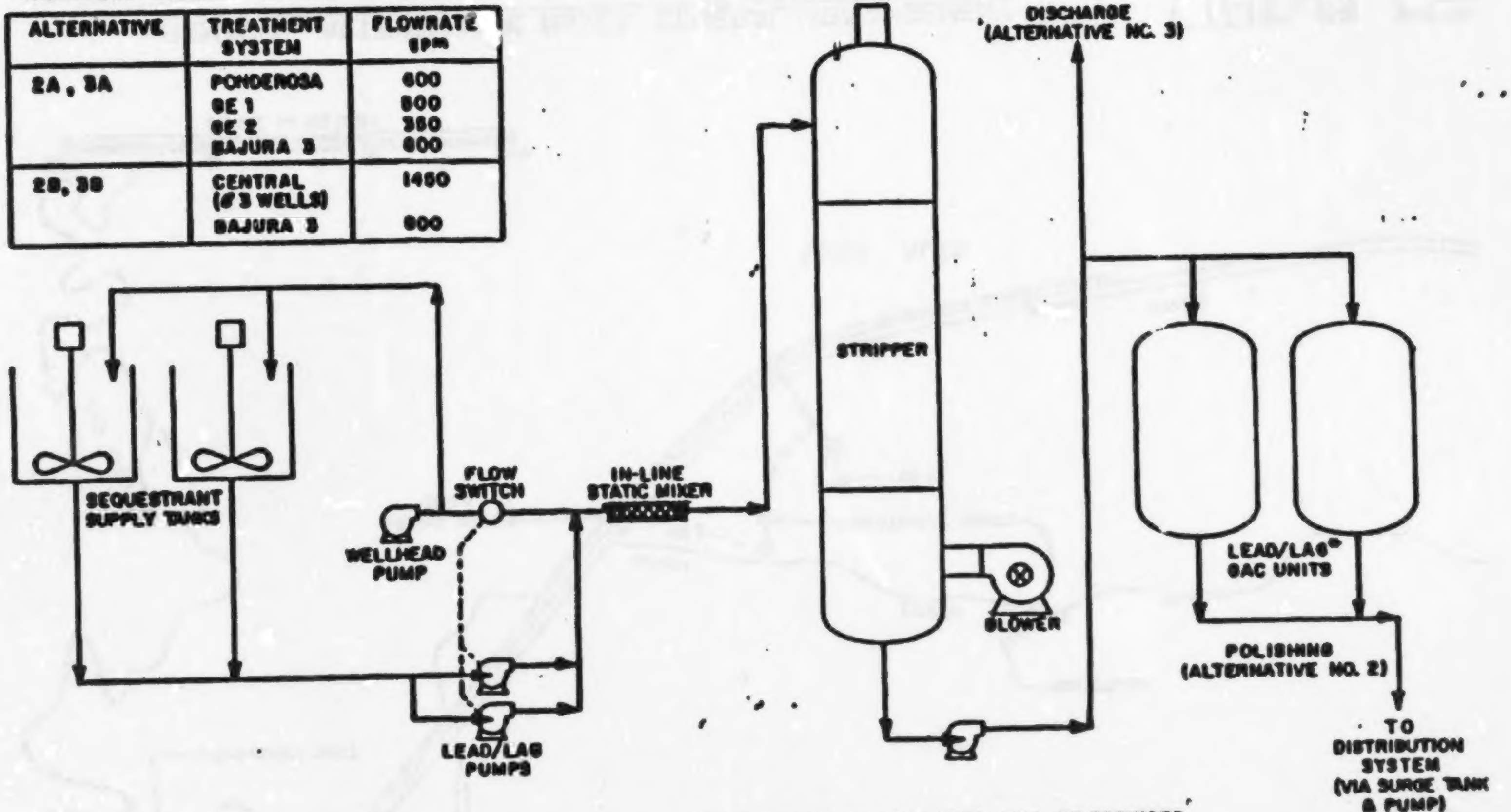
- Alternative 2A. Individual treatment units at each of 4 PRASA wells.
- Alternative 2B. Central treatment unit for 3 PRASA wells, Ponderosa, GE 1, GE 2, and an individual treatment unit for PRASA Bajura 3 well.

A typical treatment process for each alternative is shown on Figure 6. The general arrangements of Alternatives 2A and 2B are provided on Figures 7 and 8, respectively.

With the installation of this treatment system, the existing public health risks from ingestion would be reduced to levels below 1×10^{-6}. Treatment of wellwater to levels below the 1×10^{-6} ingestion risk level will meet all Federal and State ARARs. The treatment systems are expected to be reliable and provide long term mitigation of the human health risks assuming proper operation and maintenance of the systems. Pretreatment units for scaling control are proposed for each treatment system to minimize maintenance due to mineral deposition within the air strippers. Carbon columns might require periodic replacement to supply fresh carbon, however, shut down

TREATMENT SYSTEM FOR EACH ALTERNATIVE

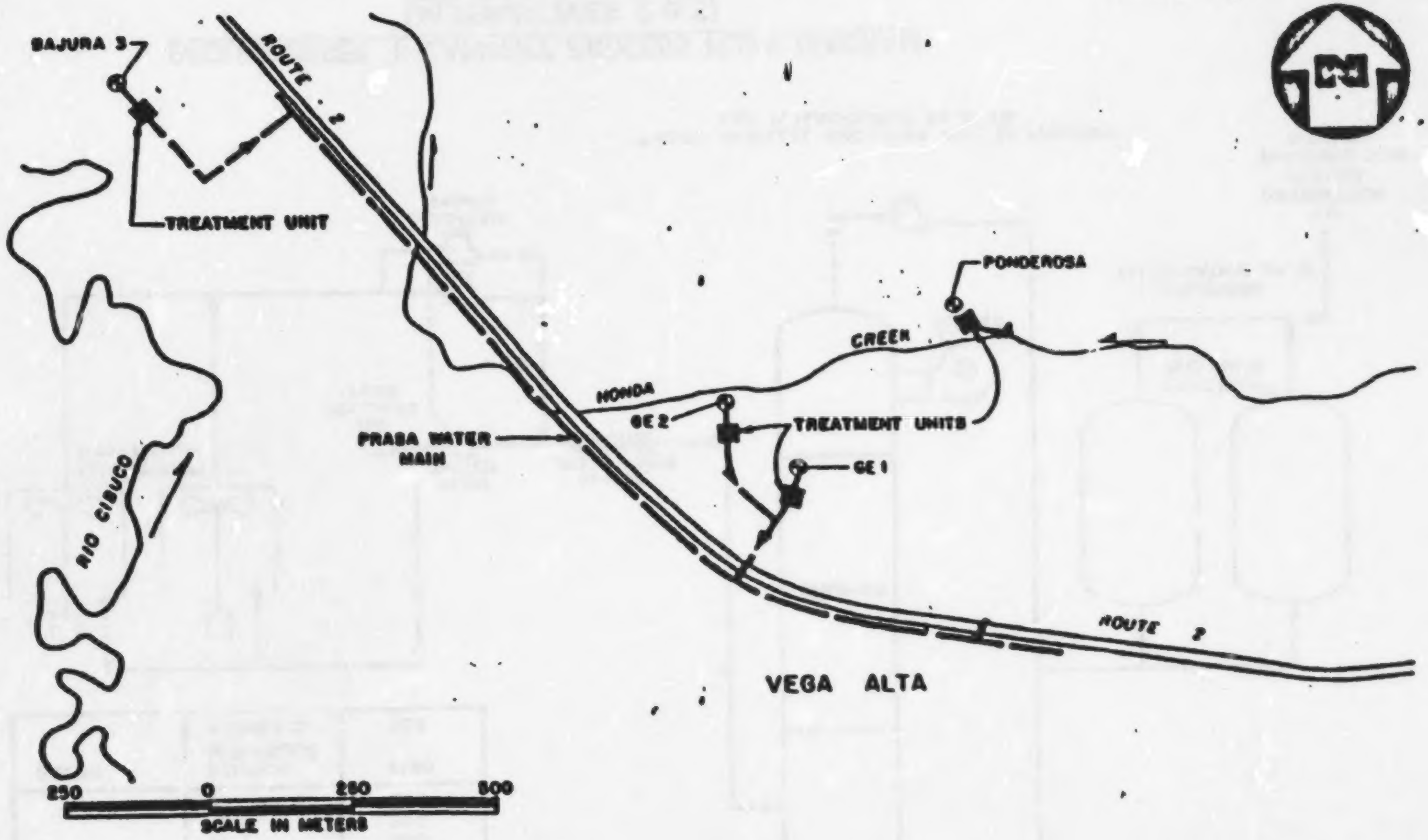
ALTERNATIVE	TREATMENT SYSTEM	FLOWRATE gpm
2A, 3A	PONDEROSA GE 1 GE 2 BAJURA 3	600 800 350 600
2B, 3B	CENTRAL (#3 WELLS) BAJURA 3	1450 800


DISCHARGE
(ALTERNATIVE NC. 3)
STRIPPER
SEQUESTRANT SUPPLY TANKS
FLOW SWITCH
IN-LINE STATIC MIXER
WELLHEAD PUMP
LEAD/LAG PUMPS
BLOWER
LEAD/LAG* GAC UNITS
POLISHING
(ALTERNATIVE NO. 2)
TO DISTRIBUTION SYSTEM
(VIA SURGE TANK & PUMP)

*NOTE: PARALLEL GAC UNITS WILL BE PROVIDED FOR ALTERNATIVES 2B & 3B.

GROUNDWATER TREATMENT PROCESS FLOW DIAGRAM
(ALTERNATIVES 2 & 3)
VEGA ALTA SITE, VEGA ALTA, PR

NUS CORPORATION


BAJURA 3
ROUTE 2
TREATMENT UNIT
RIO CIBUCO
PONDEROSA
CREEK
HONDA
GE 2
TREATMENT UNITS
GE 1
PRASA WATER MAIN
ROUTE 2
VEGA ALTA
250
0
250
500
SCALE IN METERS

REMEDIAL ALTERNATIVE No. 2A GENERAL ARRANGEMENT
VEGA ALTA SITE, VEGA ALTA, PR

NUS CORPORATION

7

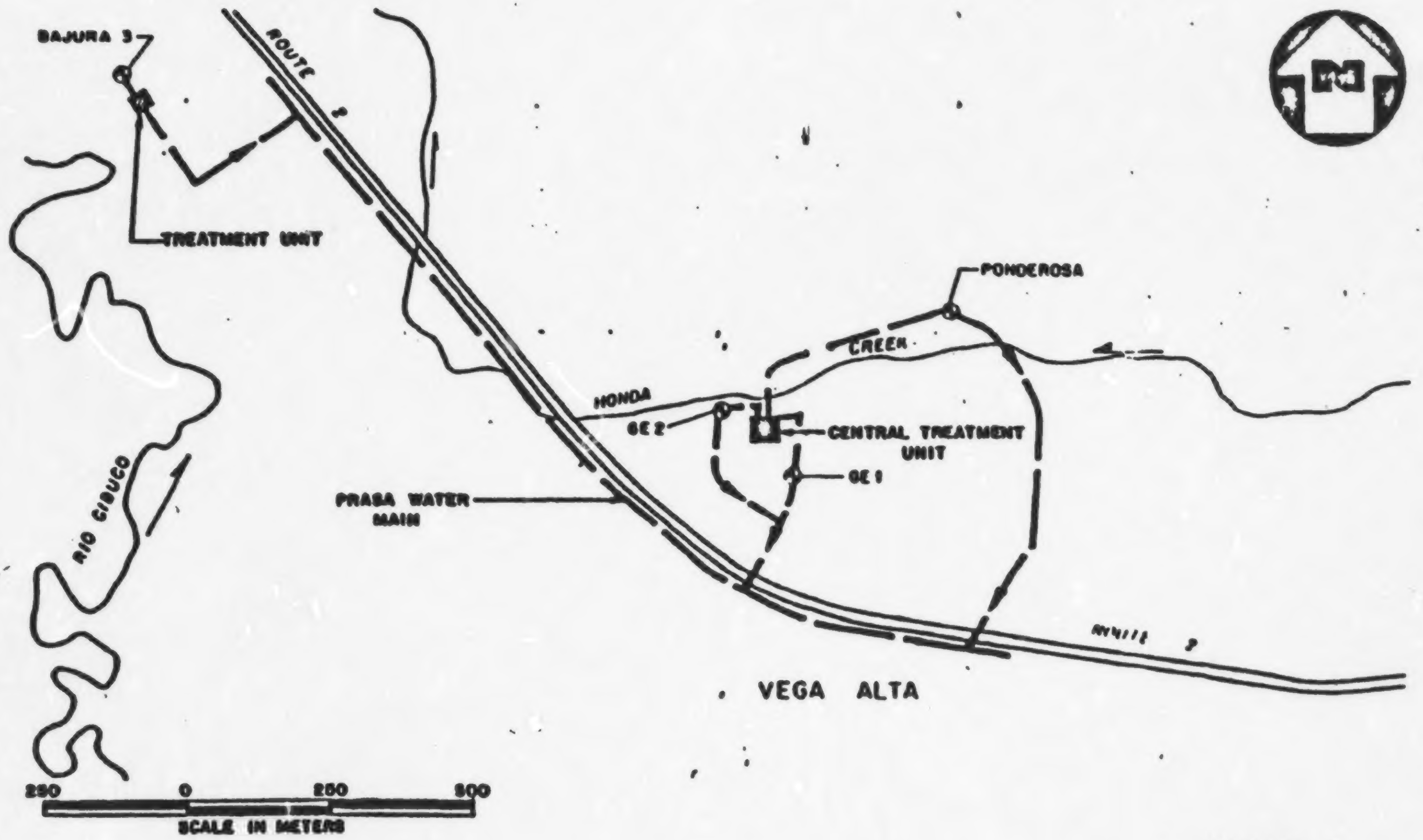

BAJURA 3
ROUTE 2
TREATMENT UNIT
RIO CIBUCO
PONDEROSA
HONDA
CREEK
GE 2
CENTRAL TREATMENT UNIT
GE 1
PRASA WATER MAIN
ROUTE 2
VEGA ALTA
250
0
250
500
SCALE IN METERS

FIGURE 8

NUS CORPORATION

REMEDIAL ALTERNATIVE No. 2B GENERAL ARRANGEMENT
VEGA ALTA SITE, VEGA ALTA, PR

time would be minimal and is not expected to cause a significant shortage in water supply. Preliminary estimates indicate that carbon unit life for Alternatives 2A and 2B is 19 years at an assumed influent volatile concentration of 20 ppb. At this rate, shut down time of the carbon columns for replacement is expected to be negligible over the life of the system. The design of the air stripper and carbon adsorption units should be supported by bench-scale treatability testing. The bench-scale testing will also include additional groundwater sampling to establish sizing and design parameters. Sampling will continue throughout the implementation of this remedy. These tests will confirm the treatability of the groundwater using these treatment processes and will determine specific design requirements.

This alternative will meet the reduction of toxicity, mobility or volume criteria due to the fact that it would involve active removal of the groundwater contaminants at a rate exceeding the present wellfield pumping rate. Operation of the wellfield will also minimize migration of contaminants to regional downgradient areas to the north by containing contaminants within a local drawdown area.

The component technologies proposed for groundwater treatment are all demonstrated and commercially available. These technologies are expected to be technically feasible and readily implementable.

Cost estimates have been performed in detail for each of the remedial alternatives. These estimates are summarized on Table 11. Present worth costs have been estimated for a range of operation and maintenance periods. These are 1, 5, 10, and 30 years.

This alternative does not address source control actions. Insufficient site data on the source(s) is available to identify and evaluate potential remedial alternatives for source(s) remediation. However, the groundwater plume has been decreasing in contaminant concentration based on the RI data collected from September 1984 to January 1986. This may suggest that the source of groundwater contamination has either been eliminated or has decreased significantly from the period prior to September 1984. Additional investigative studies will be conducted to fully define the source(s) of the groundwater contamination and evaluate any potential of contaminants to migrate to the groundwater system at Vega Alta.

Alternative 3 - Groundwater Treatment with Surface Water Discharge and Alternate Water Supplies

This alternative involves treatment of groundwater at four PRASA wells with discharge into surface water bodies to contain the contaminant plume. Two private groundwater users will be hooked-up to the distribution system. Alternate water supplies will be provided to make up the shortage caused by removing two active public wells from service.

The wells proposed for treatment include the following:

- PRASA Ponderosa (currently inactive).
- PRASA GE 1 (currently inactive).
- PRASA GE 2 (currently active).
- PRASA Bajura 3 (currently active).

The alternative water supply will be a combination of surface water and groundwater. The 4 new wells are considered permanent water supply sources. The surface water treatment system is considered a temporary installation that will operate over the period of groundwater remediation.

Two treatment scenarios are considered under this alternative and are designated as follows:

- Alternative 3A. Individual treatment units at each of 4 PRASA wells.

- Alternative 3B. Central treatment unit for 3 PRASA wells: Ponderosa, GE 1 and GE 2 and an individual treatment unit for PRASA Bajura 3 well.

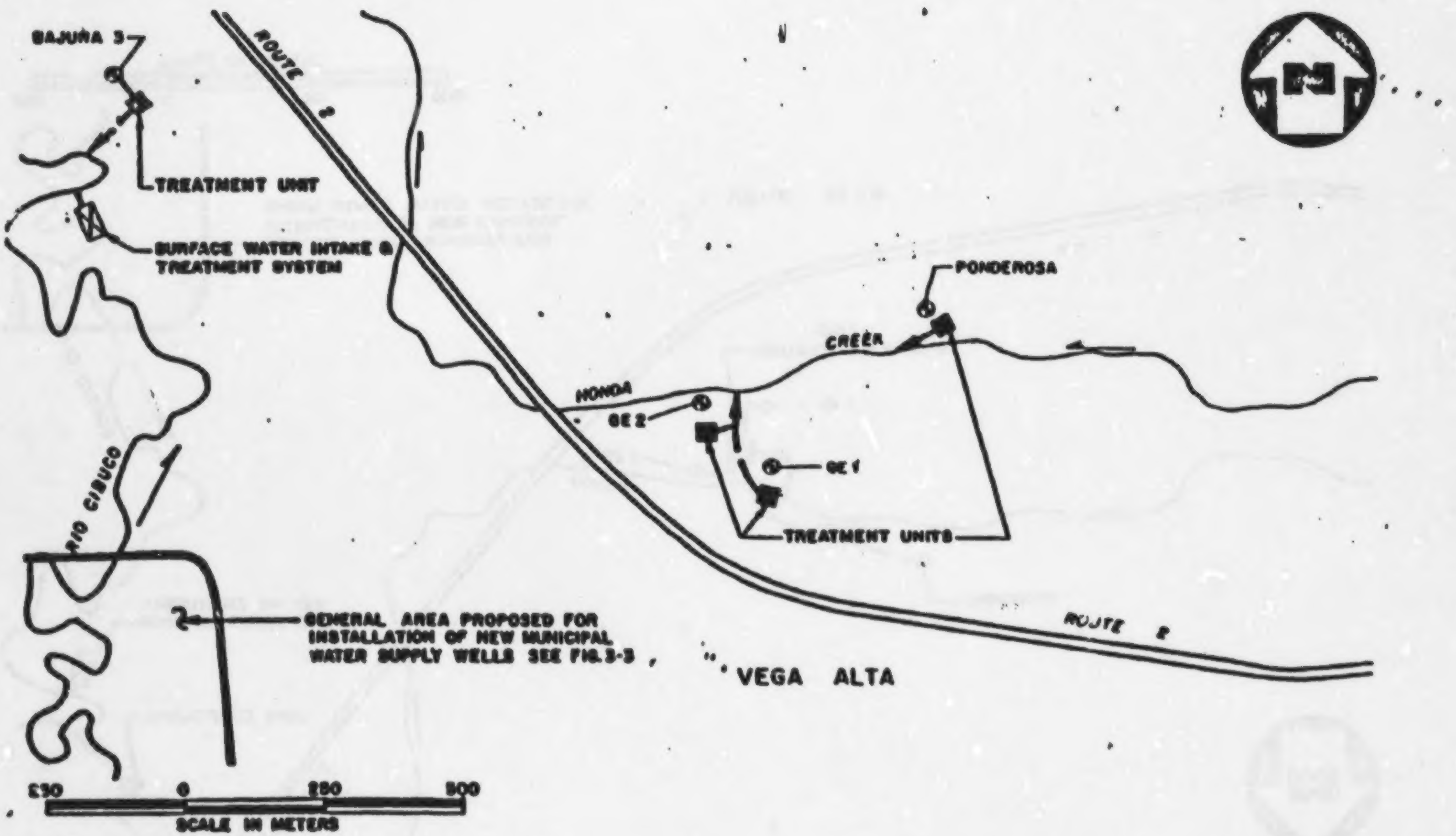
A typical treatment process for each alternative is shown on Figure 6. The general arrangements of Alternatives 3A and 3B are provided on Figures 9 and 10, respectively.

This alternative will be effective by reducing existing public health risks from ingestion to levels below 1×10^{-6} by removal of 2 active contaminated wells from the public supply system and supplementing the water supply with uncontaminated alternate water. Alternate water supply provided by 4 new wells and a surface water intake at Rio Cibuco are expected to provide water of suitable quality to meet drinking water ARARs over the long-term.

Pumping of the existing wellfield plus reactivation of two inactive wells (Ponderosa and GE 1) would involve active removal of the groundwater contaminants at a rate exceeding the present wellfield pumping rate. The start up of the Ponderosa well, in particular, will remove considerable contaminant mass since this well has historically been in the area of highest plume concentrations.

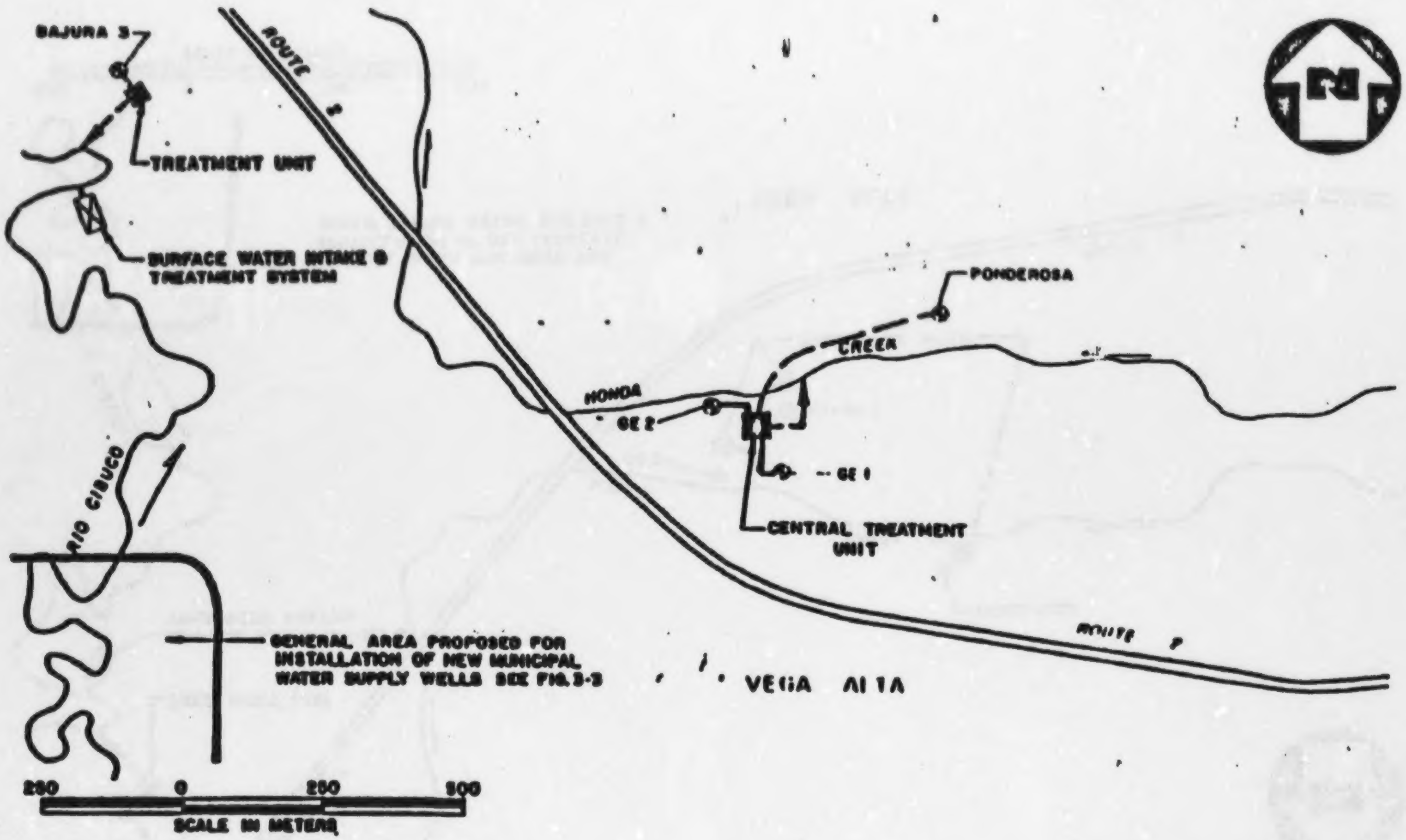
Operation of the wellfield will also minimize migration of contaminants to regional downgradient areas to the north by containing contaminants within a local composite drawdown area.

Ongoing downgradient monitoring will be required to assess migration of contaminants from the pumping wellfield area. Because of the inherent complexities of the Karst hydrogeologic system, there is potential for migration of contaminants to


BAJUÑA 3
TREATMENT UNIT
SURFACE WATER INTAKE & TREATMENT SYSTEM
ROUTE 2
PONDEROSA
CREEK
HONDA
GE 2
GE 1
TREATMENT UNITS
RIO CIBUCO
GENERAL AREA PROPOSED FOR INSTALLATION OF NEW MUNICIPAL WATER SUPPLY WELLS SEE FIG.3-3
VEGA ALTA
ROUTE 2
N
250
0
250
500
SCALE IN METERS

REMEDIAL ALTERNATIVE No. 3A GENERAL ARRANGEMENT
VEGA ALTA SITE, VEGA ALTA, PR

NUS CORPORATION


BAJURA 3
TREATMENT UNIT
SURFACE WATER INTAKE & TREATMENT SYSTEM
ROUTE 2
RIO CIBUCO
HONDA
CREEK
GE 2
GE 1
PONDEROSA
CENTRAL TREATMENT UNIT
ROUTE 2
VEGA ALTA
GENERAL AREA PROPOSED FOR INSTALLATION OF NEW MUNICIPAL WATER SUPPLY WELLS SEE FIG. 3-3
N
250
0
250
500
SCALE IN METERS

REMEDIAL ALTERNATIVE No. 3B GENERAL ARRANGEMENT
VEGA ALTA SITE, VEGA ALTA, PR

NUS CORPORATION

downgradient areas, although this has not been observed to date in the wells beyond Monterrey 2, which is in the regional downgradient direction.

The wellfield pumping will ultimately result in restoration of the groundwater to a Level I remediation quality assuming the source(s) is controlled, however, the time rate of restoration cannot be determined at this time.

Air stripping represents a long-term solution assuming proper operation and maintenance. The pretreatment units for scaling reduction will help maintain stripper treatment efficiency over the long term. Public health risks from short-term breakdowns in treatment efficiency are expected to be negligible since the stripper discharge shall not be into the water distribution system.

Demonstrated treatment efficiencies of up to 98 percent at the Ponderosa well (historically the most contaminated well) indicate that air stripping will readily meet the surface water discharge limitations set for Honda Creek. The other wells have historically lower contaminant levels than Ponderosa. Air stripping at these wells is expected to be more reliable for attainment of effluent limitations, assuming similar NPDES levels are issued for these discharges.

Treatment of surface water for potable use employs conventional treatment processes that have been demonstrated and are readily available. The ability of Rio Cibuco to supply 1145 gpm over the period of groundwater remediation is considered feasible based on the reported minimum 7-day consecutive flow rate of 3816 gpm. The minimum 1-day recorded flow at Rio Cibuco is 3322 gpm. A severe drought would necessitate reduction of withdrawal rates, however, this condition would most likely cause regional water shortages and reductions in demand would be required over a short-term.

The component technologies proposed for groundwater treatment (i.e., air stripping and pretreatment using sodium hexametaphosphate for scale control) are demonstrated and commercially available. These technologies are expected to be technically feasible and readily implementable.

Construction of new wells and a surface water treatment system employ conventional methods that are demonstrated and readily available.

The NPDES limits set for Ponderosa are assumed to be applicable for the other well treatment systems. Variations might be possible for the unit at Bajura 3 since the discharge is proposed to a point other than Honda Creek, and for the central treatment system, since the effluent loadings are expected to be greater because of the higher flow. Actual effluent limitations for any of the wells must be determined prior to final design.

Cost estimates have been performed in detail for each of the remedial alternatives. These estimates are summarized on Table 11. Present worth costs have been estimated for a range of operation and maintenance periods. These are 1, 5, 10, and 30 years.

This alternative does not address source control actions. Insufficient site data on the source(s) is available to identify and evaluate potential remedial alternatives for source(s) remediation. However, the groundwater plume has been show to be decreasing in contamination mass an average concentration based on the RI data collected from September 1984 to January 1986. This may suggest that the source of groundwater contamination has either been eliminated or has decreased significantly from the period prior to September 1984. Additional investigative studies will be conducted to fully define the source(s) of the groundwater contamination and evaluate any potential of contaminants to migrate to the groundwater system at Vega Alta.

COMMUNITY RELATIONS

The Environmental Protection Agency has conducted numerous community relation activities since the Vega Alta Public Supply Wells Site was first listed as an NPL Site. The agency has met with the citizens and local officials from Vega Alta on numerous occasions. These meetings were intended to describe the Superfund process and to inform the general public of the progress of the Remedial Investigation. A meeting was also held when the Feasibility Study and the Preferred Remedial Action Plan was first presented to the regulatory agencies. A public comment period starting on August 7, 1987 was ultilized to solicit comments on the Feasibility Study and the preferred remedy.

The public repositories for the RI and FS are the Vega Alta Mayor's Office and the EPA Caribbean Field Office in San Juan, Puerto Rico. The public was notified of the RI and FS availability by a press release which appeared in the San Juan Star and El Nuevo Dia. Following a request for extension of the public comment period by the potentially responsible parties (PRP's), the comment period was extended an additional twenty-one days to September 21, 1987.

A summary of the comments raised concerning the FS and public meeting are contained in the attached responsiveness summary.

ENFORCEMENT ANALYSIS

On August 29, 1983, EPA sent out 25 information request letters to industries located within the PRIDCO industrial park. Information obtained in reponse to the requests revealed industrial use of the same solvents that were detected in the groundwater plume. On July 27, 1984 EPA notified three companies of their liability to the federal government for costs incurred in responding at the Site: General Electric Company (as the parent of General Electric Controls, Inc., and General Electric Pilot Devices, Inc.); Motorola, Inc. (the parent of Motorola Radiomobile P.R., Inc.; and Harman Automotive, Inc. (the parent of Harman Automotive P.R., Inc.). None of the Companies indicated a willingness to voluntarily undertake the response actions outline in EPA's Notice Letter.

Motorola has conducted a field investigation of their facility, which EPA considers inconclusive.

On February 11, 1986 EPA sent information request letters to Teledyne and West. Soil sampling results obtained during the course of the RI from facilities owned and/or operated by these two companies revealed that unusually high levels of compounds had been released into the soils, which had not appeared in the groundwater plume. Specifically, samples from West showed trans-1,2-dichloroethylene at 58,000 ppb, and xylene at 64,000 ppb. Samples from the Teledyne facility showed 2-butanone at 17,000 ppb, and 2-hexanone at 8,900 ppb. 2-butanone appeared in the groundwater plume, but only at a maximum concentration of 150 ppb.

After issuance of the present document, EPA will send special notice letters to all of the PRP's in order to give them the opportunity to implement the remedy selected in the Record of Decision. Simultaneously, EPA will invite the PRP's to perform the second Operable Unit RI/FS, i.e., that portion of the Remedial Action intended to investigate and remedy the source(s).

Recommended Alternative

According to 40 CFR Section 300.68(i) of the NCP, the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of human health and the environment. In addition, CERCLA, as amended by SARA, requires protection to human health and the environment, which is cost-effective and utilizes permanent solutions and alternative treatment technologies or resource recovery options, and attains federal and state ARARs to the greatest extent practicable.

After review and evaluation of the remedial alternatives presented in the feasibility study, EPA presented Alternative 2 to the public as the preferred remedy for the Vega Alta Public Supply Wells Site.

This alternative consisted of groundwater treatment at the wellhead of four PRASA supply wells with discharge to the PRASA distribution system. The wells proposed for treatment included the following:

- PRASA Ponderosa (currently inactive)
- PRASA GE 1 (currently inactive)
- PRASA GE 2 (currently active)
- PRASA Bajura (currently active)

Pretreatment with sodium hexametaphosphate (as a scale inhibation) would be conducted. Dissolved volatile organics would be removed via air stripping followed by polishing with granular activated carbon adsorption. Treatment of the groundwater from the four PRASA supply wells would be to the equivalent 10^{-6} ingestion risk level. This would satisfy all Federal and State ARAR's related to drinking water.

Based on the input received from the appropriate Puerto Rico regulatory agencies including the Department of Health (PRDOH) the Aqueduct and Sewer Authority (PRASA) and the Water Pollution Control Committee of Puerto Rico (WPCC) a modification to the preferred remedial alternative resulted. In summary, their input includes the following:

- The Ponderosa well should be treated by air stripping with effluent discharge to Honda Creek. An existing NPDES permit for the Ponderosa Well discharge is available. Ponderosa well water should not be treated for drinking water use at this point in time since the levels of volatile organic compounds are the highest in the site area and the reliability of operating and maintaining an effective treatment system may be questionable.

- The Ponderosa well discharge of approximately 400 GPM is not needed to meet current drinking water demands for Vega Alta because PRASA is supplying sufficient water from other sources to meet the estimated demand of 3.80 Million Gallons per Day (MGD).

This recommended alternative as revised involves treatment of 4 PRASA public water supply wells and hook-up of two private groundwater wells to the PRASA distribution system. The PRASA wells and private wells are:

- PRASA Ponderosa (currently inactive)
- PRASA GE 1 (currently inactive)
- PRASA GE 2 (currently active)
- PRASA Bajura 3 (currently active)
- Monterrey 2 (currently active)
- G & M Cash and Carry (status undetermined)

Treatment of PRASA wells GE 1, GE 2, and Bajura 3 will be by individual treatment systems consisting of scaling pretreatment, air stripping and possibly activated carbon. The treatment goal will be to reduce the risk level to the $1x10^{-6}$ magnitude which will meet all federal and state ARARs. Treated effluent will be discharged into the PRASA distribution system for public use. The efficiency and applicability of the treatment processes will be evaluated by bench-scale treatability tests prior to final design and implementation of the specific treatment systems. The bench-scale testing will also include additional groundwater sampling to establish sizing and design parameters. Sampling will continue throughout the implementation of this remedy. These tests will confirm the treatibility of the groundwater using these treatment processess and will determine specific design requirements.

Treatment of Ponderosa Well will be by scaling pretreatment and air stripping. Discharge shall be to Honda Creek in accordance with the existing NPDES permit; the effluent will meet the same quality requirements as for PRASA wells GE 1, GE 2, and Bajura 3 such that Ponderosa treated water can eventually be utilized for watersupply in the future. Activated carbon treatment could be added to this treatment process should the need arise.

The Monterrey 2 and G & M wells will be shut down and each user will be connected to the PRASA distribution system to provide their water supply.

Individual well treatment systems (Alternative 2A) are expected to provide greater operational flexibility than the central treatment system (Alternative 2B). Individual systems can be shut down for routine maintenance with relatively minor effects on the water supply compared to shut down of the central system which has a flow rate of 1,450 gpm. Short-term shortages in water supply from temporary shutdown of the central treatment system can be mitigated by in-line diversion of water from adjacent regions of the PRASA distribution system. The installation of parallel, backup units at the central treatment system would prevent water supply shortages. However, capital costs associated with a dual treatment system are considered prohibitive for application of this treatment scenario.

The possibility exists for combining some of the treatment plants. The air stripper/carbon units at GE 1 and GE 2 could be combined in one treatment locastion because these two wells are near each other and therefore can be easily combined.

As noted in the preface to the alternatives evaluation section of this document, the alternatives were evaluated utilizing nine criteria for selecting a remedy. Because of the basic similarity between Alternative 2, 3 and the selected remedy, which is a variation of Alternative 2, this evaluation against criteria is presented in aggregate form below:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARAR's)

   EPA must at least incorporate the following ARARs: Maximum Contaminant Levels (MCLs)(established pursuant to the Safe Drinking Water Act); Ambient Water Quality Criteria (AWQC); Effluent Discharge Limitations (required under the Clean Water Act); and Air Emissions (regulated under the Clean Air Act). However, the FS evaluated remedies which would exceed ARARs, and attain Maximum Contaminant Level Goals (non-enforceable health goals established pursuant to the Safe Drinking Water Act), because the Vega Alta population has been exposed to these hazardous substances in their drinking water supply for several years.

   Clearly Alternative 1, the No Action Alternative would not comply with ARAR's. The level of present and future potential health risks would continue unabated.

   Alternatives 2, 3, and the Selected Alternative will attain and exceed all ARAR's

   Contaminant specific ARARs
   - Maximum Contaminant Levels

   Action specific ARAR's
   - Ambient Water Quality Criteria
   - Effluent discharge limitations
   - Air emissions

It should be noted that the ultimate attainment of MCLs will require identification and control of source(s).

2. Reduction of Toxicity, Mobility or Volume

   Clearly Alternative 1, the No Action Alternative will not meet this criteria.

Alternatives 2, 3, and the Selected Alternative will meet this criteria to the extent that the system removes contaminants from the groundwater, some reduction in toxicity and volume is achieved. As the source(s) of the contamination have not been fully investigated, the degree to which the plume management and aquifer restoration remedy reduces the volume of contaminants at the site, cannot be determined at this time.

3. Short Term Effectiveness

Alternative 1, the No Action Alternative is not effective. Alternatives 2, 3, and the Selected Alternative are effective in the short term because in all cases, the exposure of the population to the contaminants is eliminated immediately upon implementation of remedy.

There are no short term risks associated with the implementation of Alternatives 2, 3, and the Selected Alternative.

4. Long-Term Effectiveness and Permanence

Clearly, Alternative 1, the No Action Alternative is not effective Alternatives 2, 3 and selected are all equally effective in the long-term and will result in a permanent remedy in that all contaminants will be removed, the aquifer will eventually be restored and the public will not be exposed to any risk from ingestion of contaminated groundwater.

Long term effectiveness and reliability of the remedy will depend upon:

1 - Operation and Maintenance
2 - Identification and Control of source(s) of contamination

5. Implementability

Alternatives 2, 3, and the Selected Alternative are easily implementable, do not depend on untested technology, are reliable and equipment is easily available. However Alternative 2 and the Selected Alternative are easier to implement in that construction of a discharge line to Honda Creek is not necessary.

6. Cost

Alternatives 2 and selected are the most cost-effectiveness remedies for the site. Costs are again summarized below.

Cost Summary

Alternatives	Capital Cost ($1000)	Annual O&M ($1000)
1		56
2	4,106	581
3	6,502	672
selected	3,677	574

7 & 8. Community and State Acceptance

The community and the Commonwealth of Puerto Rico were opposed to Alternative 1, the No Action Alternative.

The Community and State support the selected remedy in general, incorporating control of the contaminant plume, the pumping of wells and the utilization of treated water in PRASA distribution system, except for the Ponderosa Well.

The Community and the Commonwealth of Puerto Rico are opposed to the utilization of treated Ponderosa well waters in the distribution system.

EPA determined that this concern had recommended merit and has been incorporated as a modification of Alternative 2 (the Selected Alternative); i.e., water from the Ponderosa Well will be discharged directly into a surface water body with the existing NPDES discharge permit.

9. Overall Protection of Human Health and the Environment

Alternative 1, No Action, would not meet this criteria as contamination would remain in the groundwater system at levels exceeding MCLs, posing contamination risks of ingestion and exposure.

Alternative 2, 3 and the Selected Alternative would be fully protective of human health and ensure that contamination level would be reduced below MCLs, therefore this criteria will be met.

EPA WORK ASSIGNMENT NO. 143-2LA1
EPA CONTRACT NO. 68-01-7250

EBASCO SERVICES, INC.

RESPONSIVENESS SUMMARY
FOR THE
VEGA ALTA SITE
VEGA ALTA, PUERTO RICO

SEPTEMBER 1987

NOTICE

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VEGA ALTA SITE
VEGA ALTA, PUERTO RICO
RESPONSIVENESS SUMMARY FOR THE FEASIBILITY STUDY AND PROPOSED REMEDIAL ACTION PLAN

The U.S. Environmental Protection Agency (EPA) released the Remedial Investigation on July 21, 1986 and the Feasibility Study and Proposed Remedial Action Plan (PRAP) for the Vega Alta site on August 10, 1987. Copies were placed on file at EPA's office in Santurce, Puerto Rico and the Vega Alta Mayor's Office for a 30 day public review and comment period from August 10, 1987 through September 10, 1987.

EPA also held a public meeting on August 19, 1987 at the Vega Alta City Hall, to outline the remedial alternatives, present EPA's preferred remedial alternative, and answer questions from residents and local officials about the Vega Alta site.

A responsiveness summary is required by EPA policy for the purpose of providing EPA and the public with a summary of citizen comments and concerns about EPA's preferred alternative and EPA's responses to those concerns. This community relations responsiveness summary for the Vega Alta site is divided into the following sections:

I. Overview. This section briefly outlines the proposed remedial alternatives as presented in the FS, including the preferred alternative.

II. Background on Community Involvement and Concerns. This section provides a brief history of community interest in the Vega Alta site and a chronology of community relations activities conducted by EPA during remedial activities.

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA Responses to Comments. This section summarizes major questions made verbally and in writing to EPA during the public meeting and public comment period, and provides EPA responses to these comments.

IV. Remaining Concerns. This section discusses community concerns that were not directly addressed during the comment period and that EPA should consider in planning and conducting the remedial design and remedial action for the Vega Alta site.

I. RESPONSIVENESS SUMMARY OVERVIEW

The Vega Alta site is located in the town of Vega Alta, Puerto Rico. The site is an active public water supply well field, and provides drinking water to approximately 28,425 residents in and near the town of Vega Alta, which is located approximately 32 kilometers west of San Juan.

Groundwater contamination was initially detected by USGS in June 1983 as a result of routine sampling of a public well. Detected contaminants included volatile organic compounds (VOCs) such as trichlorethene, 1,2-dichloroethene, and tetrachloroethene. As a result of these findings, the Puerto Rico Department of Health closed two wells in 1983 which resulted in a water shortage and low system distribution pressure. The opening of a new well in 1983, however, has mitigated this situation.

Subsequent testing of additional public and private wells in the area has also revealed the presence of contaminants. As a result of these findings, EPA conducted a Remedial Investigation (RI) of the Vega Alta site from April 1984 to March 1985 that included soil sampling and the installation and monitoring of groundwater wells. The objectives of the RI were to characterize the groundwater, determine the nature and extent of contamination, assess the contaminant source(s), and evaluate the migration potential of contaminants from the ground surface to the water table.

The FS for the Vega Alta site has been divided into two operable units. The first operable unit specifically addresses groundwater contamination. The source(s) of contamination will be addressed by EPA as a separate operable unit in the future.

Groundwater was selected by EPA as the first operable unit for the following reasons:

- Management of contaminated groundwater is considered by EPA to be the most important site objective to protect public health and reduce public health risks associated with ingestion of groundwater, and

- Current site data is sufficient to evaluate the extent of contaminant sources and to perform an FS of remedial alternatives.

In identifying actions to remedy groundwater contamination, EPA sought to:

- Reduce contaminant levels in the groundwater,

- Protect uncontaminated groundwater, and

- Reduce contaminant levels at the tap to prevent unacceptable human exposure.

The report (September 1987) describes several remedial alternatives that are briefly summarized below.

Alternative 1: No Action with Monitoring

Alternative 1 would not require the implementation of remedial action and the level of present and future potential human health risks would continue unabated. Groundwater monitoring would be conducted to assess the level of public risk over time, and to track migration of contaminated groundwater. Additionally, sampling of tap water and groundwater would be conducted on a quarterly basis.

Alternative 2: Groundwater Treatment with Discharge to the Public Distribution System

Under Alternative 2, contaminated public wells would be treated by air stripping and activated carbon adsorption to remove contaminants to levels acceptable for human consumption. Four public wells would require treatment: Bajura 3 (active), GE 1 (inactive), GE 2 (active) and Ponderosa (inactive). The migration of contaminated groundwater would be minimized by continued operation of the existing well field and the start up of two inactive wells. In addition, groundwater monitoring would be performed to assess the performance of the remedial action. The time period for restoration of the groundwater to acceptable quality is based on the migration rate of contaminants from the source(s) and the effectiveness of subsurface contaminant removal.

Alternative 3: Groundwater Treatment with Discharge to Surface Water and Development of Alternate Water Supplies.

Alternative 3 involves the treating of contaminanted wells by air stripping to remove contaminants to levels acceptable for the discharge of groundwater into surface water. The same four public wells described in Alternative 2, would require treatment. Water supply by new wells and surface water intake and treatment would enable the public water supply system to operate without shortages.

PREFERRED ALTERNATIVE

After careful evaluation of the remedial alternatives, EPA has selected Alternative 2: Groundwater Treatment with Discharge to the Public Distribution System, as the preferred remedial alternative for the Vega Alta site. The components of this alternative are:

- Treatment of groundwater at three wells (Bajura 3, GE 1, and GE 2) by air stripping and activated carbon adsorption;
- Discharge of treated groundwater from the wells indicated above back into the public distribution system for human consumption and other uses;
- Treatment of groundwater at the Ponderosa well by air stripping with discharge to surface water;
- The Monterrey 2, and G&M wells will be shut down and each user will be connected the the PRASA distribution system to provide their water supply; and
- Monitoring of public and private wells and distribution system taps to assess performance of the remedial action.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Community interest in the Vega Alta site is moderate. The Community Relations Plan completed by EPA in June 1984 identified four specific concerns, however, there is limited information regarding the current status of these concerns. The concerns described in the 1984 Community Relations Plan are as follows:

- Potential risk to human health associated with trichloroethylene (TCE) contamination of potable water supplies, and possible skin irritation resulting from exposure to TCE.
- The potential for concern about water shortages in Vega Alta in 1984, when several wells in the area were closed.
- Concern existed regarding the possibility that the use of wells could draw additional contaminants into the aquifer.
- In 1984, the Puerto Rico Aqueduct and Sewer Authority (PRASA) maintained the position that they were the licensed authority to draw water from aquifers in Puerto Rico. It was their opinion that they had responsibility for water supply, but were not responsible for aquifer clean up. This issue was identified in 1984 as a concern for local, state, and federal officials.

During EPA's remedial site activities, several site-specific community relations activities were conducted as part of EPA's community relations program. These activities are briefly summarized below.

- In June 1984, EPA developed a site-specific community relations plan for conducting community relations activities at the Vega Alta site throughout the RI/FS.

- A fact sheet was developed and sent to community members in August 1986. The purpose of this fact sheet was to provide interested residents with information on site background, nature of the contamination problem at the Vega Alta site, EPA's site investigation activites, EPA's goals in investigating the site, and future EPA site activities.

- A news release was issued in August 1986 to inform interested residents of an upcoming public meeting on the RI for the Vega Alta site.

- A public meeting was held on August 26, 1986 to discuss the RI and the work plan for the Vega Alta site.

- A fact sheet was developed and distributed by EPA to local officials and community members in August 1987. The purpose of this fact sheet was to discuss the FS, the proposed remedial action plan (PRAP), and to present EPA's preferred remedial alternative for cleanup of the Vega Alta site.

- On August 19, 1987 EPA conducted a public meeting to discuss the proposed remedial action plan (PRAP), EPA's preferred remedial alternative for cleanup of the Vega Alta contamination problem, and to answer any questions pertaining to the site. The meeting was attended by fourteen local officials and seven interested residents from the Vega Alta community. A summary of the comments raised at this meeting is provided in Section III.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSE TO COMMENTS

A public comment period was held from August 10, 1987 through September 10, 1987 to receive comments from the public on the FS for Operable Unit 1 and EPA's preferred remedial alternative for the Vega Alta site. The public meeing for the Vega Alta site was conducted in two sessions on August 19, 1987 at 2:00 p.m. and 5:30 p.m. at the Vega Alta City Hall, Vega Alta, Puerto Rico. The public meeting was conducted in two separate sessions in order to accommodate community preference and to ensure participation by the maximum number of residents and local officials. The sessions were attended by EPA officials, members of EPA's contractor staff and local regulatory agencies officials to discuss the feasibility study, and to apprise local residents of the agency's preferred alternative for remediation of Operable Unit 1 for the Vega Alta site. Verbal comments received during the public comment are categorized below by the following topics:

A. Technical Concerns Regarding Contaminants

B. PRP and Legal Issues

C. Communications Concerns

D. Health Risks

E. Other Concerns

In addition to comments made at the public meeting, letters were received from the following: the Office of the Governor, the Commonwealth of Puerto Rico Department of Health, the Puerto Rico Industrial Development Company, the U.S. Department of the Interior, and the Commonwealth of Puerto Rico Department of Agriculture. Comments made in these letters consist primarily of recommendations on the remedial alternatives. The latter portion of Section III of this responsiveness summary includes a brief summary of these written comments and EPA's response to these comments. In addition, copies of these letters are attached as Appendix A.

VERBAL COMMENTS RECEIVED DURING THE PUBLIC MEETING

A. TECHNICAL CONCERNS REGARDING CONTAMINANTS

1. COMMENT: A local official inquired as to the source of contaminants.

   EPA RESPONSE: EPA stated that data indicates that the source of contamination may be an industrial area in the Municipality of Vega Alta. Since this data is preliminary, EPA will conduct a more detailed second phase study in order to determine the actual source and extent of contamination.

2. COMMENT: A local official asked about the potential effectiveness of the proposed remedial measures and who would conduct groundwater sampling.

   EPA RESPONSE: EPA explained that the project is currently in the remedial design phase, however, pilot studies must be conducted under laboratory conditions to verify the efficiency of the proposed remedial measures before they are implemented.

3. COMMENT: A local official expressed concern over the potential time involved in cleanup activities, and inquired as to who would conduct the cleanup.

   EPA RESPONSE: EPA stated that the actual time involved is difficult to determine. EPA has also identified PRP's that will be asked or ordered to perform the groundwater remediation.

4. COMMENT: A resident inquired about the cost of cleanup and the time involved.

   EPA RESPONSE: EPA stated that the cost of implementing the preferred remedial alternative would be approximately $4 million with $500,000 annual operation and maintenance costs. EPA further explained that, at this point, it is difficult to estimate the exact time peroid involved. Upon completion of laboratory pilot studies, EPA will be better equipped to estimate the time involved.

5. COMMENT: A resident expressed concern over the potential effectiveness of remedial measures.

   EPA RESPONSE: EPA explained that the effectiveness of the preferred remedial alternative is very good. EPA may, however, utilize additional pretreatment technologies to ensure the effectiveness of the remedial measures.

6. COMMENT: A resident inquired about the potential for obtaining non-contaminated water by drilling of new deeper wells in areas that are not contaminated in order to avoid the expense of cleanup remedies of potential non-effectiveness of remedies.

   EPA RESPONSE: EPA stated that drilling new and deeper wells could present the risk of contaminating clean groundwater. EPA policy requires remediation of contamination rather than risking additional contamination of clean water.

7. COMMENT: A resident inquired as to the time involved in cleanup and who would assume jurisdiction over the long term maintenance of the site.

   EPA RESPONSE: Initially, EPA selects the remedial action, and affords the PRP's and opportunity to implement the remedial measures. If the PRP's do not undertake this project, EPA will assume responsibility for cleanup.

8. COMMENT: A resident asked whether EPA could ensure that contaminants are no longer released into the groundwater after remedial actions are conducted.

   EPA RESPONSE: EPA stated that there are programs within EPA that deal with preventive measures. Superfund, however, addresses remedial action after contamination has taken place.

9. COMMENT: A resident asked whether contaminants found in the water could be reduced through the use of home distallation units.

   EPA RESPONSE: EPA stated that these units are somewhat effective, however, their efficiency depends on what pollutants are being addressed, and the effectiveness of the particular distillation device.

10. COMMENT: A resident asked whether systems will be used to detect the potential failure of equipment used in remedial action.

    EPA RESPONSE: EPA explained that the equipment which will be utilized has been previously tested and proven. However, since the equipment is mechanical, the potential for failure does exist. EPA will implement additional monitoring systems in an effort to ensure the proper operation of this equipment.

B. PRP AND LEGAL ISSUES

1. COMMENT: A local official asked about the legal implications of EPA assuming financial and technical responsibility for the supply and quality of drinking water.

   EPA RESPONSE: EPA responded that when a site is included on the National Priorities List (NPL), EPA, through Superfund, assumes the responsibility to conduct remedial investigations and determine which method of cleanup will be implemented. Legal negotiations regarding these responsibilities must be coordinated with EPA, the U.S. Department of Justice, and local government agencies. EPA added that, if an activity such as the drilling of a well, is conducted on a Superfund site, and that activity leads to an increased pollution problem, the firm who drilled the well, as well as the owner of the well, could become a PRP under Superfund legislation.

2. COMMENT: A local official inquired about legal procedures regarding identification and responsibility of a PRP.

   EPA RESPONSE: EPA stated that Superfund legislation provides for a PRP to assume responsibilities for cleanup of a site. If they do not assume this responsibility, Superfund monies are used for the cleanup and legal pursuit of a PRP for recovery of expenses may be instituted. These legal remedies, however, would not stop any polluting activities. If Superfund monies are used in Puerto Rico, the local government would be required to contribute ten percent of cleanup costs. However, no local legislation exists appropriating these funds and a question remains as to whether these funds are available.

3. COMMENT: A local official asked who would be charged with filing legal action against a PRP and what the proper procedure for this action would be.

   EPA RESPONSE: EPA responded that EPA would be responsible. The procedure starts with the Environmental Quality Board here in Puerto Rico. Following their evaluation, they would then decide whether to proceed from a local standpoint or transfer the case to EPA.

4. COMMENT: A resident inquired about the identification of a PRP.

   EPA RESPONSE: EPA stated that they have identified a PRP and have notified the PRP that they are potentially liable. EPA will be conducting negotiations with the PRP in an effort to have the PRP assume responsibility for the remedial studies and actions and to implement EPA's preferred remedial alternative for cleanup of the site. If the PRP will not assume this responsibility, EPA will pursue this issue legally.

5. COMMENT: A resident asked whether there is any legislation which compels a PRP to assume responsibility for cleanup activities.

   EPA RESPONSE: EPA stated that there is legislation that provides for a PRP to assume these responsibilities, however, the PRP must do so voluntarily. EPA added that if a PRP does not assume these responsibilities, Superfund monies are used for remediation and EPA then pursues the PRP through legal channels.

C. COMMUNICATIONS CONCERNS

COMMENT: A resident expressed concern over the lack of adequate communication from EPA to elicit public participation and the lack of information provided to the public.

EPA RESPONSE: EPA responded that EPA encourages public participation and input into Superfund remedial activities and all information regarding the Vega Alta site is available for public review. EPA intends to utilize other types of communications media in order to reach the maximum number of residents in the most efficient manner.

D. HEALTH RISKS

COMMENT: A resident inquired about the human health risks related to detected contaminants, and whether EPA has conducted any studies addressing this in Vega Alta.

EPA RESPONSE: EPA stated that they conduct risk assessment studies in order to evaluate potential risk and this information is available at the information repositories to any interested party.

E. OTHER CONCERNS

COMMENT: A local official expressed concern about a request from a commercial enterprise to increase extraction of groundwater from the Vega Alta well field.

EPA RESPONSE: EPA stated that while Superfund is part of EPA, it is not the division that grants such request. EPA can inform the firm as to the legal implications of their activities regarding use of an area that has been designated a Superfund site.

WRITTEN COMMENTS RECEIVED DURING THE COMMENT PERIOD

Several written comments were received during the public comment period. These comments contained recommendations on remedial alternatives for this site. These comments and EPA's responses are summarized below.

COMMENT: Following review of the proposed remedial action plan, the Office of the Governor recommends the following course of action:

1. Re-install the stripper at Ponderosa well, and initiate its operation, discharging its waters to the environment, monitoring its VOC contents before and after the stripper, in order to measure unit removal efficiency and the level of contamination in the aquifer. (This should be accomplished as part of Superfund activities in groundwater cleanup).
2. Install strippers at wells GE 1 and GE 2, to use waters to supply the Vega Alta system, as needed.
3. Continue efforts directed towards obtaining artesian well waters from the new Vega Baja and Ponderosa sources.
4. Continue efforts for the installation of the Maguayo-5 piping system to provide dilution waters for the Vega Alta system.
5. Design and construction of a holding/mixing tank system to guarantee Vega Alta with a water supply having a maximum VOC concentration below 5 ug/l, as per EPA requirements.

EPA RESPONSE: EPA appreciates the comments and has considered them in selecting the remedial action to be implemented. In particular:

1. The Recommended Alternative includes reinstalling the stripper at the Ponderosa well. The effluent from this stripper will be discharged to Honda Creek in compliance with the NPDES permit. Sampling and analysis will be conducted to assure stripper performance and permit compliance.
2. Strippers will be installed at GE 1 and GE 2 and these waters will be discharged into the PRASA distribution system.
3. The Recommended Alternative does not include the provision of alternative water to replace Vega Alta contaminated water supply wells. The Recommended Alternative will instead provide water by treating the contaminated wells which will also restore the aquifer.

4. The Maguayo-5 piping system is also considered alternative water as Vega Baja and Ponderosa artesian waters and is not part of the remedial action.

5. The need for a holding/mixing tank system to guarantee the quality of drinking water for the Vega Alta community can be determined in Remedial Design.

COMMENT: Based on review of the draft FS for Operable Unit 1 for the Vega Alta site, the Puerto Rico Industrial Development Company offered the following recommendations:

1. The affected aquifer should be treated to eliminate present or future pollution problems or reduce them as completely as possible.

2. Only alternative 2 and 3 presented in the study appear to be viable to treat the aquifer. The final decision about the alternative to be implemented should depend on the opinion of the regulatory agencies and PRASA.

→3. It may be reasonable to combine alternatives 2 and 3 to reduce the possible concentrations of organics in the tap water. In such a case, part of the treated water will be discharged to surface waters, especially the water coming from the wells with greater concentration of organics at a given time.

4. EPA and regulatory agencies should be very careful in determing the responsible party(ies) of the original discharges of solvents. It may not be advisable to point only to the present industries as the source of the pollution.

EPA RESPONSE: EPA appreciates the comments and has considered them in selecting the remedial action to be implemented. In particular:

1. The remedial action will treat and restore the contaminated aquifer.

2. EPA is selecting a combination of alternatives 2 and 3. EPA has also considered the comments received from the agencies as well as the Vega Alta community.

3. Again EPA is selecting a combination of alternatives 2 and 3.

4. EPA has very carefully investigated the potentially responsible parties in the Vega Alta community and we have considered past industrial activities.

COMMENT: By letter dated September 14, 1987, Caribe General Electric Products, Inc. (hereinafter, "GE") raised several concerns with the RI and the FS:

1. The use of "obsolete" data in the FS as well as a lack of quantity assurance/quality control procedures. In addition, the need to obtain additional data for pretreatment processes, sizing of treatment units, data on alternative drinking water supply sources;

2. The evaluation of cost-effectiveness was not sufficient in determining remedial actions;

3. Legal issues related to due process and EPA's notice procedures under Superfund;

4. The fact that contaminant concentrations in the aquifer have decreased over time;

5. GE proposed new remedial alternatives that would be limited to just supplying alternative water to Vega Alta and increasing the pumping of uncontaminated wells to provide the needed water.

EPA RESPONSE:

1. EPA used the data gathered in the RI to form the basis of remedial activities evaluated in the FS. This is the usual procedure with Superfund sites. EPA will gather current data in the Remedial Design stage when the details on the actual sizing of the treatment units will be determined. All of the data gathered during the RI was quality assured/quality controlled. EPA and EPA's contractors follow very specific and strict procedures in these efforts and the quality assurance/quality control documents are avaliable through EPA if necessary. Alternative water supplies were evaluated in the FS in Section 3.2.5 Alternate Water Supplies on page 48. The use of the Maguayo Well is a temporary measure only and the continued use of other wells in the area would spread the contamination in the aquifer. The use of new water supply wells could spread the contamination as well. Surface water sources identified include Rio Ciubuco and Rio de la Plata and the Rio Ciubuco was preferred because it is a better source as is described on page 53. Alternate water supply is carried forward as a remedial alternative in the FS to the detailed evaluation stage. New water supply wells are described on page 54.

2. EPA takes issues with GE on this topic. The Feasibility Study was written using the CERCLA, as amended by SARA, the National Contingency Plan, as well as all the current EPA guidance documents pertaining to Feasibility Studies and Superfund actions.

3. Contrary to GE's assertions, EPA did formally notify GE of its intent to initiate investigatory actions itself, and did attempt to bring GE into the RI/FS process as early as possible, specifically, by way of letter on July 27, 1984. GE did not volunteer to undertake response actions itself, as EPA requested. EPA determined that GE was a potential source of contamination in or around March of 1984, after EPA TAT investigations revealed that GE operations and disposal methods utilized the same chlorinated solvents that were detected in the plume.

EPA did not defer source identification until after the selection of the remedial action; as is stated above, EPA had already identified sources. Rather, EPA defered issues of source control until after selection of the remedial action. As has been stated upon numerous occasions, source control was considered less critical from a public health standpoint since groundwater remediation is estimateed to require a longer time period than source control, which can be accomplished early in the lifetime of the groundwater restoration period, especially in light of the fact that decreasing concentration and mass of the plume indicated that the plume had stabilized, i.e., the source of contamination had either been eliminated or had decreased.

4. EPA agrees, and the RI and the FS so states, that the level of contaminants in the aquifer have decreased over the course of investigative activities. These concentrations have not decreased to levels suitable for potable purposes, i.e., not to the ARAR level necessary for purposes of this FS. Therefore, remedial actions are necessary here.

5. The two new remedial alternatives proposed by GE are discussed in the FS. However, the provision of alternate water, by itself, would not remove contaminants from the aquifer. The removal of contaminants is a necessary objective as stated in the FS.

> COMMENT: By letter dated September 24, 1987, Teledyne Packaging, Inc., P.R., (hereinafter, "Teledyne") raised several concerns with the RI and FS. Their concerns were transmitted via letter from the law firm of Peter, Hamilton & Scheetz. Teledyne's concerns are listed below:
>
> 1. Teledyne takes issue with not having sufficient time to review the RI and FS stating that Teledyne was not advised of its rights to comment on the FS until September 5, 1987.
>
> 2. Teledyne states that the studies failed to consider data trends that have shown contaminant level reductions over time. Teledyne goes on to say that the data was outdated, unreliable, and invalid. In addition, the documents failed to assess health risks and appropiate remedial alternatives.

3. Teledyne also went on to say that the studies failed to identify contaminant sources and failed to assess the effectiveness of the treatment technology.

EPA RESPONSE:

1. The community at Vega Alta was informed of the results of the Remedial Investigation on July 21, 1986 when EPA held public meetings and presented and discussed the RI. Teledyne should have been aware of this public outreach activity on the part of EPA. In early August, EPA issued press releases announcing the availability of the Vega Alta FS and also announcing the upcoming public meeting to be held on August 19. The Vega Alta community, which includes the industries in Vega Alta was therefore informed of the availability of the FS.

On February 11, 1986, EPA sent Teledyne and information request letter. Teledyne's soils and groundwater were sampled by EPA's contractors in from September 1983 through March 1985. It is therefore EPA's position that Teledyne had constructive notice of government activity at the site.

2. EPA agrees that there have been reductions in contaminant levels during the course of the RI. EPA used the data gathered in the RI to form the basis of remedial activities evaluated in the FS. This is the usual procedure with Superfund sites. EPA will gather current data in the Remedial Design stage when the details on the actual sizing of the treatment units will be determined. All of the data gathered during the RI was quality assured/quality controlled and is therefore valid data. EPA evaluated health risks associated with consuming contaminated water by establishing remedial objectives at the Maximum Contaminant Level Goal. This level was established because the Vega Alta population has already been exposed to these contaminants for some time.

3. The RI identified the contaminant sources and Teledyne was named as a contaminant source. EPA identified 2-butanone in soil at the Teledyne facility. 2-butanone was identified in the groundwater contaminant plume downgradient of the facility. This data, as was the other data in the RI, was quality assured and therefore EPA is confident that this data is valid.

The treatment technology of air stripping volatile organic compounds is a proven and valid method of treating water to remove these contaminants.

IV. REMAINING CONCERNS

This section describes additional community concerns that EPA should be aware of in preparing to undertake the remedial design and remedial action at the Vega Alta site.

Communication of Information. Concern has been expressed that information to the public regarding the Vega Alta site has not been adequate. Concern focuses on the relay of information to community members regarding how the public is notified of public meetings and the availability of remedial investigative findings.

Enforcement Actions. Local offices expressed an interest in being kept informed on the progress of any enforcement action taken by the agency.

Site Activity During the Remedial Action Phase. Future remedial activities may generate additional interest in the Vega Alta site. The community should be informed as to the schedule, type, and duration of these activities.

APPENDIX A

WRITTEN COMMENTS SUBMITTED DURING THE PUBLIC REVIEW AND COMMENT PERIOD FOR THE VEGA ALTA SITE

DRN

DEPARTAMENTO DE RECURSOS NATURALES

1987 SEP PM 3 06
CARIBBEAN FIELD OFFICE
SANTURCE PUERTO RICO

SET. 0 2 1987

Sr. Pedro Gelabert, Director
Oficina Regional para el Caribe
Agencia de Protección Ambiental Federal

RE: RBM III PROGRAM
DRAFT FEASIBILITY STUDY
VEGA ALTA SUPERFUND SITE

Estimado señor Gelabert:

Hemos evaluado el documento de referencia y le sometemos a continuación nuestros comentarios para su consideración y acción pertinente.

El Departamento de Recursos Naturales está de acuerdo con la Agencia de Protección Ambiental (APA) en su enfoque de proponer, como primera acción, el atender la situación de contaminación del acuífero en Vega Alta, orientando ésta hacia el problema de riesgos a la salud, asociados a la utilización del agua subterránea como fuente de agua potable y a atender el problema de contaminación del acuífero. Sin embargo, la solución final del problema requerirá que se identifique adecuadamente y a la brevedad posible la fuente de contaminación y la forma en que ésta llega hasta el agua subterránea. Las alternativas que APA ha considerado a corto plazo sugieren que la solución del problema pueda tomar hasta treinta (30) años. Este Departamento espera una solución permanente al problema planteado en un plazo de tiempo razonablemente corto, dada la importancia vital del acuífero para satisfacer las necesidades de abasto presentes y futuras del pueblo de Vega Alta.

Es evidente que urge el que se pase, inmediatamente, a la segunda etapa de diagnóstico del problema; es decir, a la identificación de la fuente de contaminación y a los mecanismos de movimiento del contaminante hacia la fuente de agua.

Tenemos una opinión diferente a APA, en cuanto a las medidas específicas recomendadas a corto plazo. Este Departamento y otras agencias gubernamentales que componen el Comité Para el Control de la Contaminación del Agua (en el cual APA está representada), han evaluado el problema de Vega Alta de forma integral, tomando en consideración las posibilidades de la AAA, que es la agencia gubernamental más afectada por el problema de

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contaminación en este caso. Se ha sugerido un posible curso de acción para resolver el problema de Vega Alta a corto plazo. Estas recomendaciones del Comité están contenidas en una carta del 17 de agosto de 1987 que le sometiera a EPA la Junta de Calidad Ambiental (JCA) relacionada con este asunto. El Departamento, como parte de este Comité, subscribe la opinión de la JCA expresada en esta comunicación. Se incluye copia de esta carta.

En términos especificos, queremos señalar sobre este documento, que hay incertidumbre sobre la cantidad exacta de agua que los pozos de la AAA en el área contaminada suplían a Vega Alta. Se ha indicado que esta cifra puede ser de alrededor de 3 mgd solamente. Esto puede implicar que el periodo de bombeo necesario para el proceso de la limpieza del acuifero puede ser mayor. APA debe precisar esta información e incorporarla a las medidas. La diferencia resulta del hecho de que en el inventario de los pozos que consideró la APA (tabla 1.1, pág. 7) se incluyeron varios que ubican en otros municipios y no están integrados al servicio de Vega Alta. Estos son: Sabana Hoyos 1, Sabana Hoyos 2, Sabana Hoyos 3, Manati 1 y Monserrate.

El Departamento reconoce que tiene autoridad y responsabilidad de ley sobre el agua subterránea y los usuarios de ésta. Sobre esta base estamos estudiando la posibilidad de declarar el área contaminada como un Area Critica, tomando como base la situación problemática descrita y evaluada en el documento de referencia y siguiendo los requisitos establecidos en la reglamentación sobre agua, especificamente en el articulo 12 del Reglamento Para el Aprovechamiento, Uso, Conservación y Administración de las Aguas de Puerto Rico, copia del cual se incluye. Confiamos mantener como hasta el presente la más estrecha colaboración entre ambas agencias para asegurar una eficiente implantación de nuestras responsabilidades.

Atentamente,

Justo A. Méndez

Justo A. Méndez,
Secretario

Anejos

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COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR
Environmental
Quality Board

August 17, 1987

Mr. Pedro A. Gelabert, Director
Caribbean Field Office
US Environmental Protection Agency
1413 Fernández Juncos Ave.
Santurce, Puerto Rico 00909

Dear Mr. Gelabert:

Pertaining to the "Draft Feasibility Study Report", which your office recently submitted to this Board for comments, we wish to indicate activities which have been carried out and are not included in said report. These were personally communicated to Mr. José Font, by Mr. C.M. Jiménez, during a meeting on this subject held at your facilities on August 6, 1987.

The Vega Alta situation, as well as similar other situations in the island where aquifer contamination has been detected, has come to the attention of this Board and become a priority item. To this effect, in September of 1986, and under the coordination of this Agency, the Committee for the Control of Water Contamination was created; having as Members representatives from the Department of Health, Department of Natural Resources, the U.S. Geological Survey, Aqueduct and Sewer Authority, and the U.S. Environmental Protection Agency. Ms Racqueline Shelton is your representative in this Committee.

While the stated purpose of the Committee is to explore and recommend alternatives for water decontamination, the search for adequate sources of drinking water became a natural task, particularly in locations such as Vega Alta, where the more stringent scheduled standards could create a lack of water for the region. As a result of our activities, various alternatives have been explored and actions have been initiated which have a direct bearing in the schemes presentes as options in your Report.

A brief summary of these is as follows:

Sep. 30, 1986 a) The AAA and Dept. of Health agree that it is easier and more desirable to purchase and locate new strippers on wells GE-1 and GE-2 than to move the Ponderosa stripper to such sites.

b) The utilization of Ponderosa water for public consumption would require trials with dual strippers in series to determine

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if required levels can be attained, plus O & M program to guarantee sta efficiency. This alternative was not considered practical.

c) Surface water sources in Manatí will be employed in Vega Alta; but this is a long term project of no value for the present situation.

Oct. 28, 1986 a) Utilization of strippers in series with activated carbon filters at wells GE-1 and GE-2 was evaluated at $255,000, and more than a year for design and construction.

b) Bringing water from Maguayo-5 and improving the distribution net for remaining Maguayo wells was evaluated at $1,556,000. This alternative was selected for design and construction. This source will enable substitution for contaminated sources at Vega Alta. Tanks for mixing and dilution would be required in order to bring down contamination levels in the Vega Alta water fraction to be used.

c) Surface water from Río Indio remains as option. This would require a treatment plant and systems for dilution with existing Vega Alta sources.

Nov. 25, 1986 a) The AAA informs that existing water supply systems can provide up to 3.85 MGD, while demand projections for 1995 are of 4.07 MGD, for Vega Alta.

Jan 22, 1987 a) The Maguayo to Vega Alta supply scheme is expected to be operational by mid 1987. Water delivery expected is 800 gpm. The equalization tank will be built as a second stage of the project.

Feb. 24, 1987 a) A spring located in the Maguayo area was evaluated to yield between 200,000 to 1 MGD. A small fraction of its waters are presently used to supply a livestock farm; the rest flows freely to a receiving water body and eventual discharge to the sea. This source will remain as a possible alternative for future consideration.

b) The alternative of strippers in series at Ponderosa was considered as unnecessary

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possible water supply, since other sources are now possible at lower cost.

c) Garrochales 1 & 2 were reported closed due to CCl4 contamination. Samplings are to be conducted to determine if and when they can be placed in service.

Jun. 31, 87 a) Based upon a listing of the operational status of wells, provided by the AAA, a priority list for remedial actions was prepared by EQB. Top priority is assigned to operational wells, yielding higher values of VOC contamination, down to a level of 5 mg/l. (See attached list.)

July 23, 1987 a) The Maguayo-5 well water supply alternative is expected to start operations by October, 1987. Artesian sources, mixed with Maguayo-5 and treated General Electric - 1 and 2 can provide the necessary water supply for Vega Alta.

b) The Artesian well located at Vega Baja was completed. This well could provide from 300 to 600 gpm to the Vega Alta system.

c) The Garrochales-3 well does not exhibit VOC contamination, for which it will remain operational.

Note: Information obtained early in August from AAA indicates that an Artesian well was completed at the Ponderosa well site. No information is yet available on its yield.

Conclusions

After reviewing the EPA Remedial Action Plan for Vega Alta, and taking into consideration the progress so far made by the Water Quality Control Committee, we recommended the following course of action:

1. Re-install the stripper at Ponderosa well, and initiate its operation, discharging its waters to the environment, monitoring its VOC contents before and after the stripper, in order to measure unit removal eficiency and the level of contamination in the aquifer. (This should be accomplished as part of Superfund activities in groundwater cleanup.)

2. Install strippers at wells GE-1 and GE-2, to use waters to supply the Vega Alta system, as needed.

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3. Continue efforts directed towards obtaining Artesian well waters from the new Vega Baja and Ponderosa sources.

4. Continue efforts the installation at the Maguayo-5 piping system to provide dilution waters for the Vega Alta system.

5. Design and construction a holding/mixing tank system to guarantee Vega Alta with a water supply having a maximum VOC concentration below 5 ug/l, as per coming EPA requirements.

We hope these recommendations are useful to responds towards EPA goals. Please feel free to request additional clarifications, if needed.

Cordially,

Santos Rohena, Jr.
Chairman

CMJB/iv

cc: Sr. Tomás Rivera
Srta. Marisol Morales
Miembros Comité de Agua

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DAC
JF

COMMONWEALTH OF PUERTO RICO
DEPARTMENT OF HEALTH
OFFICE OF THE SECRETARY

1987 AUG 24 PM 5:06
CARIB[illegible] OFFICE
SANTURCE. PUERTO RICO

August 24, 1987

Mr. Pedro Gelabert, Director
Caribbean Field Office
U.S. Environmental Protection Agency
1413 Fernández Juncos, Ave.
Santurce, Puerto Rico 00909

Dear mister Gelabert :

In relation to the " DRAFT FEASIBILITY STUDY REPORT " we have the following comments :

1. On May 5, 1983 the Department of Health (DOH) ordered the closing of Ponderosa well and air stripper treatment for GE-1 and GE-11 wells located nearby, PRASA installed the air stripper at the Ponderosa well instead.

2. On April 1985 the DOH ordered PRASA to :

   a. Open Ponderosa well and pump treated well water from air stripper to the approved receiving water body and comply with the monitoring specified requirements and effluent limitations in the NPDES permit given to PRASA by the USEPA on August 24, 1984.

   b. Monitor for concentrations of T3 and T4 of wells GE-1, GE-11 and Ponderosa on a weekly basis.

The purpose of these requested actions were :

- To improve the quality of the water pumped from GE-11.

- To lower concentrations of contaminants on GE-1 well which remains closed with a possibility in the near future to open the well for drinking water if the concentrations are low enough to permit such action.

CALL BOX 70184 SAN JUAN, PUERTO RICO 00936

- To clean the aquifer by extracting water from the Ponderosa well which contain very high concentrations of the contaminants.

- To provide the needed data to evaluate the effectiveness of the air stripper in the removal of T3 and T4.

3. The DOH have two representatives members in the Committee for the Control of Water Contamination which is under the coordination of the Environmental Quality Board. This committee has been studying and evaluating the situation in Vega Alta. As a result it was recommended a course of action in a letter sent to you on August 17, 1987 which we support.

4. Finally, we are enclosed a copy of Regulation # 50. Articles III and IV of this Regulation should be consider in the Regulatory References (Appendix D).

Yours truly

Ricardo J. Mayoral Abella, J.D.
Assistant Secretary for
Environmental Health

37—

COMMONWEALTH OF PUERTO RICO
PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY

RAFAEL L. IGNACIO
PRESIDENT & GENERAL MANAGER

355 F.D. ROOSEVELT AVE.
HATO REY, PUERTO RICO 00918
TEL. (809) 766-4747

August 24, 1987

Eng. José Font
Remedial Project Manager
U.S. Environmental Protection Agency
Podiatry Center, 2nd Floor
1413 Fernandez Juncos Avenue
Santurce, Puerto Rico 00909

'87 AUG 25 PM 4 17
[illegible] FIELD OFFICE
SANTURCE, PUERTO RICO

Dear Mr. Font:

Re: Draft Feasibility Study
Operable Unit Number 1
Groundwater
Vega Alta Site
Municipality of Vega Alta
Puerto Rico

Reference is made to your August 7, 1987 letter in relation to the above mentioned document. Based on the information presented in the document and at the public meeting held in Vega Alta we present the following comments.

1. It is our opinion that the affected aquifer should be treated to eliminate present or future pollution problems or reduce them as completely as possible.

2. Only alternatives 2 and 3 presented in the study appear to be viable to treat the aquifer. The final decision about the alternative to be implemented should depend on the opinion of the regulatory agencies and PRASA.

3. It may be reasonable to combine alternatives 2 and 3 to reduce the posible concentrations of organics in the tap water. In such a case, part of the treated water will be discharged to surface waters, specially the water coming from the wells with greater concentration of organics at a given time.

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G.P.O. BOX 2350, SAN JUAN, PUERTO RICO 00936-2350

4. It is our opinion that EPA and regulatory agencies should be very carefull in determining the responsible party(ies) of the original discharges of solvents. It may not be advisable to point only to the present industries as the source of the pollution.

Thank you for your interest in consulting our agency about this matter.

Sincerely yours,

Rafael L. Ignacio
President and General Manager
Puerto Rico Industrial Development Company

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PAG. 71

JF —

COMMONWEALTH OF PUERTO RICO
DA GRICULTURE
P.O. Box 10163
Santurce, Puerto Rico 00908

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION II
1987 SEP 16 PM 5:30
CARIBBEAN FIELD OFFICE
SANTURCE, PUERTO RICO

September 4, 1987

Mr. Pedro A. Gelabert, Director
Caribbean Field Office
1413 Fernández Juncos Avenue
Santurce, Puerto Rico 00909

Re: Vega Alta Public Supply Wells Site,
Vega Alta, Puerto Rico

Dear Mr. Gelabert:

This is in response to your letter dated August 7, 1987, which is related to the report of reference.

The Department of Agriculture of the Commonwealth of Puerto Rico has no objection to the recommended action plan for cleanning up the contaminated public wells involved in the PRASA water system for Vega Alta Municipality.

Please, let us know if we can be of any further assistance.

Cordially yours,

Juan Bauzá Salas
Secretary of Agriculture

TALENT AND DEDICATION AT THE SERVICE OF AGRICULTURE

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
CARIBBEAN FIELD OFFICE
P.O. BOX 491
BOQUERON, PUERTO RICO 00622

September 5, 1987

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION II
1987 SEP 14 PM 5:29
CARIBBEAN FIELD OFFICE
SANTURCE, PUERTO RICO

Mr. Pedro A. Gelabert
Director, Environmental Potection Agency
Caribbean Field Office
1413 Fernández Juncos Avenue
Santurce, Puerto Rico 00909

Re: Draft Feasibility Study,
Vega Alta Site

Dear Mr. Gelabert:

This is in reply to your August 7, 1987, letter requesting our comments on the above referenced document. We find the document to be well-written and informative. Since the problem at Vega Alta deals exclusively with groundwater conatamination, we do not anticipate significant impacts on Federally listed threatened or endangered species, or their critical habitats. We therefore agree with your recommended clean-up action and urge you to continue monitoring until the contamination problem is resolved.

Sincerely,

Robert T. Pace

Robert T. Pace
Acting Field Supervisor

CC:
DNR, San Juan
EPA, New York
EQB, Terrestrial Ecology Division

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